This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

MEMORANDUM

ON

MECHANICAL TESTS OF SOME INDIAN TIMBI

BY

W. H. EVERETT, B.A., B.E., M.I.Mech.E., M.I.E.E.,

Professor of Mechanical and Electrical Engineering,
Sibpur Engineering College.

CALCUTTA:
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA.
1906.

ON

MECHANICAL TESTS OF SOME INDIAN TIMBER

BY

W. H. EVERETT, B.A., B.E., M.I.Mech.E., M.I.E.E.,
Professor of Mechanical and Electrical Engineering,
Sibpur Engineering College.

CALCUTTA:
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA
1906.

Forest Bulletins previously issued.

No. 1. 1905 . A Note upon the "Bee-Hole" Borer of teak in Burma.

No. 2. 1905. . A Note on the Quetta Borer (*Æolesthes sartus*).

No. 3. 1905. . A Note on the Chilgoza (*Pinus gerardiana*) Bark-Boring Beetles of Zhob, Baluchistan.

No. 4. 1906. . The natutal growth and artificial propagation of *Ficus elastica* with a description of the method of tapping trees and of preparation of its rubber for the market.

No. 5. 1906. . A Note on a visit to some European Schools of Forestry.

MEMORANDUM

ON

MECHANICAL TESTS OF SOME INDIAN TIMBERS.

DURING the last three or four years the Forest Department has sent specimens of many Indian timbers to Sibpur Engineering College for mechanical testing. I have now tested about 100 pieces, out of nearly 500 received, and it appears advisable to give some account of the results obtained.

After some consideration I decided to limit the strength tests of each specimen to three, *viz.*, shearing along the grain, endwise crushing, and bending. Tests of stiffness have been made during the bending tests. Timber never fails in tension; and tests of transverse crushing do not give definite results, as the yielding is gradual. For the shearing tests a clamping block was made, after preliminary trials, designed to prevent the test piece from bending at the middle and ends, thus leaving it no alternative but to shear. In preliminary experiments this apparatus was found to give consistent results on test pieces of teak ranging in thickness from $\frac{1}{2}''$ to $2''$; but I adopted $1''$ as the standard thickness for all the tests given below.

The test pieces for crushing were about $2''$ square by $4''$ long, except in a few cases where the specimen sent was less than $2''$ thick. In every case the test piece was square in section and of length double the side of the square.

The bending tests were made on the full section of specimen sent, mostly about $3\frac{1}{2}''$ by $2''$ but more in many cases; and the span adopted

as the pressure foot are designed to avoid damage to
' local crushing.

ır fact that the strength of timber depends considerably
; partly seasoned wood wi h 20% of moisture has only
trength of well-seasoned wood with 10% of moisture.
present specimens have been seasoned indoors in the
ıtta for two years or more, and are therefore on a fairly
s regards seasoning. Two or three pieces which were
dity were found to have about 10% of moisture, but it
ɜ to test all the specimens for this property.

ing the results it is convenient to use teak as a standard
comparison; and it will be seen that the strongest timbers
re than double the strength and stiffness of teak, while
t have less than half that of teak. To aid comparison with
bers the highest results are here given from tests made
ns of wood grown in various British colonies, the tests
ɛd by Prof. Unwin:—

ing 1·246 (Lignum vitæ, from Jamaica).
ing 5·96 (Sneeze wood, from Natal).
ng 9·52 (Red milkwood, from Natal).
ss 1,465 (Mora wood, from British Guiana).

results from tests of 32 American timbers, carried out
ction of the Government of the United States, may also
in this connection. These again are the highest figures,
: average of many tests:—

ing 0·58 (Cedar elm).
ing 4·9 (Pignut hickory).
ng 8·4 (Do.).
ess 1,220 (Do.).

are all given in tons per square inch.

ɜ with the present results, it will be noticed that three of
nbers break the record for shearing strength, two for
gth, and two for bending strength. One Indian timber
in stiffness to the best American wood, and is surpassed
of. Unwin's list of 87.

ırd to the considerable differences in strength or stiffness
ore specimens of the same kind of timber, these are not

due to experimental errors but to actual differences in the pieces tested. The accuracy of the results can be safely relied upon within 1% in the case of the strength tests and within about 5% in the figures for stiffness. This possible error in the stiffness is chiefly owing to want of exact proportionality between load and deflection for timber, which is never quite homogeneous and thus bends irregularly.

The strength is given in tons per square inch, and the stiffness is Young's modulus of elasticity in the same units. In this respect I have followed Unwin. For comparison with the co-efficient of bending strength "P" given in Gamble's "Manual of Indian Timbers" for some woods, the present results for bending strength should be multiplied by 124·4; and the present figures for stiffness should be multiplied by 5·19 to compare with the corresponding data "E" in the same work.

For the identification of the timbers I am indebted to the Forest Officers who selected and despatched them. A specimen of each timber has been kept for reference.

			Shearing strength along the grain (tons per sq. in.).	Crushing strength along the grain (tons per sq. in.).	Bending strength (tons per sq. in.).	Stiffness, from bending tests, E. (tons per sq. in.).
1	Tectona grandis (*Teak*)	Pegu	0·600	3·19	4·10	570
2	Ditto	Do.	0·580	3·20	4·76	520
3	Ditto	Do.	0·571	2·90	5·40	575
4	Ditto	Do.	0·620	2·81	3·86	405
5	Shorea assamica	Lakhimpur	0·593	2·85	5·27	700
6	Dillenia indica	Kamrup	0·625	3·48	6·2	680
7	Ditto	Do.	0·663	3·09	4·4	635
8	Baccaurea sapida	Do.	0·553	3·15	5·13	630
9	Ditto	Do.	0·377	...	5·05	615
10	Ditto	Do.	0·567	2·71	4·13	515
11	Bischofia javanica	Do.	...	2·81	3·98	...
12	Ditto	Do.	...	...	3·67	380
13	Canarium bengalense	Do.	0·680	2·72	2·15	273

		Shearing strength along the grain (tons per sq. in.).	Crushing strength along the grain (tons per sq. in.).	Bending strength (tons per sq. in.).	Stiffness, from bending tests, E. (tons per sq. in.).
Canarium bengalense .	Kamrup . .	0·613	2·29	2·83	243
Bauhinia variegata .	Do. . .	0·576	1·78	2·44	235
Ditto .	Do. . .	0·670	1·90	(1·83)	(187)
Symplocos grandiflora .	Darang . .	0·482	1·63	2·35	371
Ditto .	Do. . .	0·424	1·48	1·77	224
Ditto .	Do. . .	0·710	2·07	3·92	367
Villebrunea appendiculata.	Do. . .	0·522	2·30	3·20	366
Ditto .	Do. . .	0·493	1·82	3·66	349
Ditto .	Do. . .	0·615	1·95	3·43	395
Casuarina equisetifolia (*Casuarina*).	Ganjam . .	1·075	4·39	6·00	900
Ditto .	Do. . .	0·693	4·13	7·57	930
Ditto .	Do. . .	1·240	4·20	6·05	1108
Sapindus trifoliatus .	N. Arcot . .	1·310	4·05	...	...
Ditto .	Do. . .	1·680	4·14	...	...
Ditto .	Do. . .	0·965	3·94	5·32	630
Pterocarpus santalinus .	Do. . .	2·000	6·64	6·47	780
Ditto .	Do. . .	1·550	5·44	4·72	740
Ditto .	Do. . .	1·440	6·95	7·57	900
Pterocarpus dalbergioides (*Padouk*).	Andamans .	1·150	4·87	5·57	650
Ditto .	Do. . .	1·310	4·00	5·03	844
Ditto .	Do. . .	1·050	4·09	4·43	600
Albizzia Lebbek (Bth.) .	Do. . .	0·835	4·50	6·62	767
Ditto .	Do. . .	1·030	4·28	5·43	707
Ditto .	Do. . .	0·866	4·04	5·65	730
Terminalia bialata .	Do. . .	1·070	3·74	6·90	900
Ditto .	Do. . .	0·792	3·78	7·70	964
Ditto .	Do. . .	0·862	3·69	7·34	950

			Shearing strength along the grain (tons per sq. in.).	Crushing strength along the grain (tons per sq. in.).	Bending strength (tons per sq. in.).	Stiffness, from bending tests, E. (tons per sq. in.).
41	Myristica Irya (Gaertn.)	Andamans .	0·878	3·78	7·62	880
42	Ditto .	Do. .	0·990	4·28	7·27	805
43	Ditto .	Do. .	0·642	4·57	7·35	870
44	Diospyros Kurzii (Hiern.)	Do. .	1·000	3·78	4·34	724
45	Ditto .	Do. .	0·990	4·24	5·19	795
46	Ditto .	Do. .	0·848	3·98	5·34	900
47	Murraya exotica . .	Do. .	1·230	4·55	7·00	753
48	Ditto .	Do. .	1·400	5·27	7·49	898
49	Ditto .	Do. .	1·490	4·47	6·09	688
50	Lagerströmia hypoleuca (Kurz.)	Do. .	0·592	3·49	4·52	617
51	Ditto .	Do. .	0·785	2·82	4·36	610
52	Ditto .	Do. .	0·752	2·67	4·30	490
53	Terminalia procera (Roxb.)	Do. .	0·528	4·12	6·35	690
54	Ditto .	Do. .	0·498	3·76	4·19	510
55	Ditto .	Do. .	0·940	4·54	8·84	892
56	Alphonsea ventricosa (H. F. & Th.).	Do. .	0·938	3·34	5·40	750
57	Ditto .	Do. .	0·543	3·91	7·71	900
58	Ditto .	Do. .	0·582	3·78	6·32	702
59	Artocarpus Lakoocha (Roxb.).	Do. .	0·925	4·88	6·82	902
60	Ditto .	Do.	0·715	4·34	5·65	780
61	Ditto .	Do. .	0·980	4·45	8·03	802
62	Calophyllum spectabile (Willd.)	Do. .	0·768	2·86	3·90	509
63	Ditto .	Do. .	0·625	2·61	4·49	516
64	Ditto .	Do. .	0·762	2·68	5·23	605
65	Calophyllum Inophyllum	Do. .	0·763	2·70	3·36	439
66	Ditto .	Do. .	0·700	2·93	4·83	490
67	Ditto .	Do. .	0·882	3·14	4·32	490

		Shearing strength along the grain (tons per sq. in.).	Crushing strength along the grain (tons per sq. in.).	Bending strength (tons per sq. in.).	Stiffness from bending tests, E. (tons per sq. in.).
Podocarpus bracteata (Bl.)	Andamans ..	0·684	3·46	5·80	677
Ditto .	Do. .	0·803	3·62	6·46	740
Ditto .	Do. .	0·600	3·63	5·42	700
Mimusops littoralis (Kurz).	Do. .	0·477	3·06	4·03	534
Ditto .	Do. .	0·820	3·82	6·51	750
Ditto .	Do. .	0·800	3·44	5·70	636
Mimusops Elengi (Linn.)	Do. .	1·380	5·18	10·65	1,029
Ditto .	Do. .	1·220	4·92	10·00	1,106
Ditto .	Do. .	1·390	4·93	10·48	1,100
Mesua ferrea (Linn.) .	Do. .	0·876	6·60	12·18	1,300
Ditto .	Do. .	1·000	5·92	9·23	1,140
Ditto .	Do. .	1·160	6·52	10·93	1,180
Hopea odorata (Roxb.) .	Do. .	0·992	3·80	8·29	940
Ditto .	Do. .	0·737	4·32	7·32	950
Ditto .	Do. .	1·150	4·21	8·37	903
Bombax insigne (Wall)	Do.	0·398	1·79	3·32	490
Ditto .	Do. .	0·352	1·60	2·79	485
Ditto .	Do. .	0·488	2·01	2·68	440
Adenanthera pavonina (L.)	Do. .	1·040	4·57	6·16	790
Ditto .	Do. .	0·900	4·43	..	...
Ditto .	Do. .	0·915	4·57	6·72	880
Artocarpus Chaplasha (Roxb.)	Do. .	0·550	2·89	4·45	480
Ditto .	Do. .	0·600	3·30	3·13	401
Machilus odoratissima (Lalie.)	Darjeeling .	0·555	2·05	3·47	530
Ditto .	Do. .	...	1·94	...	...
Ditto .	Do. .	0·596	2·50	4·02	594

			Shearing strength along the grain (tons per sq. in.).	Crushing strength along the grain (tons per sq. in.).	Bending strength (tons per sq. in.).	Stiffness, from bending tests, E. (tons per sq. in.).
387	Michelia excelsa (Magnolia).	Darjeeling .	..	...	4·21	500
388	Ditto .	Do. .	0·573	2·27	4·85	532
389	Ditto .	Do. .	0·316	2·75	...	...
390	Quercus lamellosa (Hill Oak).	Do. .	1·180	3·54	6·60	778
391	Ditto .	Do. .	1·025	3·13	4·75	...
392	Ditto .	Do. .	1·010	3·20	...	...
393	Bucklandia populnea (Pipli).	Do. .	...	...	4·25	618
394	Ditto .	Do. .	0·575	2·54	...	...
395	Ditto .	Do. .	...	...	4·90	...
396	Castanopsis Hystrix (Chestnut).	Do. .	0·810	2·57	...	...
397	Ditto .	Do. .	...	...	5·20	520
398	Ditto .	Do. .	...	...	4·23	633

G. I. C. P. O.—No. 25 R. & A.—4-6-1906.—2,000.—H. R.

REPORT

OF

TESTS OF METALS FOR INDUSTRIAL AND OTHER PURPOSES.

1.

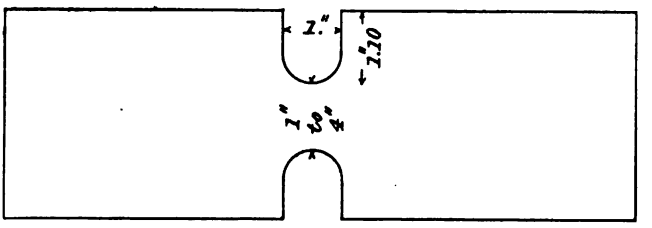
DETAILS OF RIVETED JOINTS.

GROOVED SPECIMENS $\frac{3}{8}''$–$\frac{3}{4}''$ IRON AND STEEL PLATE.

Description of tests.

These experiments were made with the material employed in riveted joints, tensile tests of which are found in Report of Tests for the year 1882, pages 10 and 11. In the same report, pages 142–145, may be found experiments with grooved specimens $\frac{1}{4}''$ iron and steel plate.

Form of specimens.



The specimens were held by their ends in the hydraulic jaws of the testing-machine, leaving 4″ exposure.

Before testing, two parallel lines 1″ apart were laid off, covering the grooved section.

The distances between points on these lines were measured after fracture, and recorded in the columns headed "Elongations in 1″ length."

The distance at the center is found in column C, and distances $\frac{1}{2}''$, 1″, $1\frac{1}{2}''$, and 2″ from the center in columns 1, 2, 3, and 4, respectively.

As the wider specimens fail in detail, fractures first appearing at the bottom of the grooves, from thence extending towards the center of the specimen, to obtain the actual stretch of metal at the edges it is necessary to subtract from the apparent elongations the width of opening at the edges which is found after fracture of the plate.

Photographs show the appearance of specimens while fracture is in progress, and after it has been completed.

TENSILE TESTS OF GROOVED WROUGHT-IRON PLATES.

DRILLED SPECIMENS, 1″ GROOVES.

[Distance between holder jaws, 4″.]

Number of test.	Nominal dimensions.		Actual dimensions.		Sectional area.	Ultimate strength.		Area at fracture.	Contraction of area.	Elongation			
	Width.	Thickness.	Width.	Thickness.		Total.	Pounds per square inch.			4	3	2	1
	In.	*In.*	*Inch.*	*Inch.*	*Sq. in.*	*Pounds.*		*Inches.* *Sq. in.*	*Perct.*	*In.*	*In.*	*Inch.*	*Inch.*
4432	1	¼	.98	.376	.368	18,720	50,870	.95 x .31 = .295	19.9	.....	.....	.....	.13
4433	1	¼	.98	.377	.369	19,430	52,660	.95 x .31 = .295	20.1	.....	.....	.....	.15
4434	2	¼	1.98	.379	.750	37,280	49,710	1.92 x .30 = .576	23.2	.....	.....	.26	.20
4435	2	¼	2.00	.380	.760	37,870	49,830	1.99 x .30 = .597	21.4	.....	.....	.20	.16
4436	2½	¼	2.50	.390	.975	48,990	50,250	2.47 x .33 = .815	16.4	.....	.28	.20	.16
4437	3	¼	3.00	.392	1.176	53,100	45,150	2.99 x .34 = 1.017	13.5	.....	.20	.15	.13
4438	3	¼	3.00	.393	1.179	56,050	47,540	2.96 x .34 = 1.006	14.7	.....	.27	.20	.17
4439	3½	¼	3.50	.392	1.372	60,290	43,940	.....	.....	.....	.....	.....	.....
4440	3½	⅜	3.49	.390	1.361	63,280	46,490	3.46 x .32 = 1.107	18.7	.29	.24	.18	.15
4441	1	⅜	.99	.477	.472	22,250	47,140	.96 x .40 = .384	18.6	.....	.....	.....	.16
4442	1	⅜	1.00	.479	.479	23,170	48,370	.97 x .40 = .388	19.0	.....	.....	.....	.16
4443	1½	⅜	1.49	.510	.760	38,940	51,240	1.46 x .42 = .613	19.3	.....	...	.24	.19
4444	1½	⅜	1.49	.512	.763	39,300	51,510	1.46 x .42 = .613	19.7	.....	.....	.23	.19
4445	2	⅜	1.98	.514	1.018	50,950	50,050	1.95 x .43 = .839	17.6	.....	.....	.22	.17
4446	2	⅜	1.98	.516	1.022	48,840	47,790	1.94 x .44 = .854	16.4	.....	.....	.20	.16
4447	2½	⅜	2.51	.520	1.305	59,480	45,580	2.47 x .45 = 1.112	14.8	.....	.25	.19	.16
4448	2½	⅜	2.52	.516	1.300	58,450	44,960	2.47 x .45 = 1.112	14.5	.....	.24	.19	.16
4449	3	⅜	3.00	.515	1.545	69,500	44,980	2.98 x .45 = 1.341	13.2	.....	.24	.19	.16
4450	3	⅜	3.01	.519	1.562	73,460	47,030	2.98 x .44 = 1.311	16.1	.....	.25	.18	.16
4451	3½	⅜	3.51	.513	1.801	83,150	46,170	3.49 x .43 = 1.501	16.7	.29	.22	.18	.16
4452	3½	⅜	3.49	.514	1.794	80,300	44,760	3.46 x .43 = 1.488	17.1	.30	.24	.20	.18
4453	4	⅜	3.99	.510	2.035	92,250	45,330	3.95 x .43 = 1.699	16.5	.28	.22	.18	.16
4454	4	½	3.98	.513	2.042	91,900	45,000	3.94 x .44 = 1.734	15.1	.30	.23	.19	.17
4456	4	½	4.00	.506	2.024	93,300	46,100	3.96 x .42 = 1.663	17.8	.30	.23	.19	.17
4457	1	⅝	.97	.628	.609	28,760	47,220	.95 x .55 = .523	14.1	.....	.....	.....	.13
4458	1	⅝	1.00	.626	.626	30,260	48,350	.98 x .56 = .549	12.3	.....	.....	.....	.13
4459	1½	⅝	1.52	.625	.950	44,810	47,170	1.49 x .55 = .820	13.7	.....	.....	.20	.16
4460	1½	⅝	1.49	.629	.937	43,600	46,530	1.46 x .56 = .818	12.7	.....	.....	.18	.14
4461	3	⅝	2.98	.613	1.827	88,100	48,220	2.95 x .52 = 1.534	16.0	.....	.25	.21	.17
4462	3½	⅝	3.46	.616	2.131	101,800	47,770	3.42 x .50 = 1.710	19.8	.33	.25	.19	.17
4463	3½	⅝	3.47	.617	2.141	96,140	44,900	3.45 x .53 = 1.829	14.6	.28	.22	.17	.15
4464	4	⅝	3.91	.625	2.444	109,600	44,840	3.89 x .54 = 2.101	14.0	.28	.21	.18	.15
4465	4	⅝	3.96	.626	2.479	111,800	45,100	3.92 x .54 = 2.117	14.6	.25	.19	.15	.14
4466	1	¾	.99	.695	.688	32,680	47,500	.98 x .65 = .637	7.4	.....	...	.....	.12
4467	1	¾	.99	.691	.684	36,100	52,780	.96 x .65 = .624	8.8	.....	.....	.....	.09
4468	1½	¾	1.51	.692	1.045	50,650	48,470	1.48 x .64 = .947	9.4	.....	.....	.15	.13
4469	3½	¾	3.44	.700	2.408	114,980	47,750	3.40 x .59 = 2.006	16.7	.32	.25	.21	.17
4470	3½	¾	3.49	.692	2.415	111,940	46,350	3.45 x .58 = 2.001	17.1	.35	.28	.24	.21

TENSILE TESTS OF GROOVED WROUGHT-IRON PLATES.

DRILLED SPECIMENS, 1″ GROOVES.

[Distance between holder jaws, 4″.]

Depth in 1″ length.					Appearance of fracture.	Remarks.
C.	1	2	3	4		
Inch.	*Inch.*	*Inch.*	*Inch.*	*Inch.*		
.13	.13	.....	.....	.....	Fibrous lamellar	Fractured edges meet.
.15	.16	.....	.....	.....	....do	Do.
.18	.20	.26	.....	.....	....do	Fracture open at edges ″.02.
.15	.16	.20	.....	.....	....do	Fracture open at edges ″.03.
.15	.16	.20	.28	.....	Fibrous lamellar, surface cracks.	Fracture open at edges about ″.08.
.12	.13	.15	.20	.....	Fibrous seamy.....	Do.
.16	.14	.19	.27	.....	Fibrous lamellar.....	Do.
.....	.....	.....	.....	.....	.....	Test discontinued when load on specimen had fell to 30,000 pounds (photograph).
.14	.16	.19	.23	.30	Fibrous lamellar.....	Fracture open at edges ″.08.
.14*	.16	.....	.....	.....	....do	Fractured edges meet.
.14	.16	.....	.....	.....	....do	Fracture open one side ″.02.
.18	.19	.24	.....	.....	....do	Fracture open at edges ″.03.
.17	.19	.24	.....	.....	....do	Do.
.17	.18	.23	.....	.....	....do	Fracture open at edges ″.05.
.15	.16	.21	.....	.....	....do	Do.
.15	.17	.21	.26	.....	....do	Fracture open at edges ″.08.
.15	.15	.19	.24	.....	....do	Fracture open at edges ″.07.
.15	.16	.19	.24	.....	....do	Fracture open at edges ″.08.
.16	.17	.20	.26	.....	....do	Fracture open at edges ″.09.
.15	.16	.18	.22	.30	....do	Fracture open at edges ″.10.
.16	.17	.19	.24	.31	....do	Do.
.16	.18	.21	.25	.29	....do	Fracture open at edges ″.12; 20,000 pounds load on specimen at time of fracture.
.16	.18	.20	.24	.31	....do	Fracture open at edges ″.12.
.16	.17	.19	.22	.30	....do	Do.
.12	.13	.....	.....	.....	....do	Fractured edges meet.
.12	.12	.....	.....	.....	....do	Do.
.14	.15	.20	.....	.....	....do	Fracture open at edges ″.02.
.13	.14	.18	.....	.....	....do	Fracture open at edges ″.03.
.16	.18	.22	.26	.....	....do	Fracture open at edges ″.10.
.16	.17	.20	.26	.33	....do	Do.
.15	.17	.19	.23	.28	Fibrous lamellar, with fine granular stratification.	Do.
.14	.16	.18	.22	.28	Fibrous lamellar.....	Do.
.14	.15	.17	.20	.26	....do	Do.
.11	.12	.....	.....	.....	....do	Fractured edges meet. (Specimens tested cross-wise the grain.)
.06	.09	.....	.....	.....	....do	
.12	.13	.15	.....	.....	....do	
.16	.17	.18	.23	.32	....do	Fracture open at edges ″.08.
.19	.18	.20	.25	.33	....do	Fracture open at edges ″.10.

TENSILE TESTS OF GROOVED WROUGHT-IRON PLATES—Continued.

PUNCHED SPECIMENS.

[Distance between holder-jaws, 4″. Diameter of punch, 1″. Diameter of die, 1 1/16″.]

Number of test.	Nominal dimensions.		Actual dimensions.		Sectional area.	Ultimate strength.		Area at fracture.	Contraction of area.	Elongation			
	Width.	Thickness.	Width.	Thickness.		Total.	Pounds per square inch.			4	3	2	1
	In.	*In.*	*Inch.*	*Inch.*	*Sq. in.*	*Pounds.*		*Inches. Sq. in.*	*Perct.*	*In.*	*In.*	*Inch.*	*Inch.*
4471	1	⅜	1.01	.373	.377	17,720	47,000	.....	.....	.....	.....	.....	.....
4472	1	⅜	.98	.370	.363	17,250	47,520	1.00 x .33 = .330	9.1	.....	.....	.....	.09
4473	2	⅜	2.00	.382	.764	30,380	39,760	2.00 x .33 = .660	13.6	.....	.....	.16	.14
4474	2	⅜	2.02	.383	.774	28,350	36,630	2.02 x .33 = .667	13.8	.....	.....	.14	.13
4475	2½	⅜	2.39	.390	.932	35,040	37,600	2.36 x .34 = .802	13.9	.....	.18	.16	.14
4476	3	⅜	2.98	.395	1.177	42,770	36,340	2.97 x .34 = 1.010	14.2	.....	.20	.17	.15
4477	3	⅜	2.98	.392	1.168	45,800	39,210	2.97 x .33 = .980	16.1	.....	.19	.16	.14
4478	3½	⅜	3.47	.390	1.353	50,980	37,680	.....	.....	.....	.....	.....	.....
4479	3½	⅜	3.47	.389	1.350	51,760	38,340	3.47 x .34 = 1.180	12.6	.20	.19	.18	.14
4480	1	½	.97	.467	.453	23,020	50,820	.97 x .43 = .417	7.9	.....	.....	.....	.12
4482	1½	½	1.48	.506	.749	33,770	45,090	1.46 x .45 = .657	12.3	.....	.....	.20	.18
4483	1½	½	1.49	.506	.754	33,970	45,050	1.48 x .47 = .696	7.7	.....	.....	.15	.14
4484	2	½	1.91	.513	.980	41,650	42,500	Uncertain	.....	.....	.....	.15	.13
4485	2	½	1.97	.512	1.009	43,820	43,430	1.96 x .46 = .902	10.6	.....	.....	.15	.13
4486	2½	½	2.47	.516	1.275	50,250	39,410	2.47 x .45 = 1.111	12.9	.....	.18	.16	.14
4487	2½	½	2.41	.513	1.236	45,100	39,720	2.41 x .45 = 1.084	12.3	.....	.17	.16	.13
4488	3	½	3.00	.515	1.545	60,180	38,950	2.99 x .45 = 1.345	12.9	.....	.22	.18	.17
4489	3	½	2.90	.517	1.499	55,900	37,290	2.90 x .45 = 1.305	12.9	.....	.18	.15	.13
4490	3½	½	3.50	.520	1.820	68,790	37,800	3.50 x .45 = 1.575	13.4	.24	.22	.18	.15
4491	3½	½	3.49	.513	1.790	67,600	37,770	3.49 x .44 = 1.536	14.2	.22	.20	.17	.15
4492	4	½	4.00	.515	2.060	73,600	35,730	3.98 x .44 = 1.751	15.0	.22	.19	.17	.15
4493	4	½	4.03	.516	2.079	76,280	36,690	4.03 x .46 = 1.854	10.8	.21	.18	.15	.14
4494	4	½	3.99	.511	2.039	75,450	37,000	.....	.....	.....	.....	.....	.....
4495	4	½	4.03	.508	2.047	76,600	37,420	4.00 x .45 = 1.800	12.1	.26	.23	.20	.18
4496	1	⅝	.97	.614	.596	29,660	49,770	.97 x .59 = .572	4.0	.....	.....	.....	.09
4497	1	⅝	1.01	.619	.625	33,100	52,960	1.00 x .59 = .590	5.6	.....	.....	.....	.10
4498	1½	⅝	1.48	.618	.915	42,380	46,320	1.48 x .58 = .858	6.2	.....	.....	.15	.13
4499	1½	⅝	1.52	.620	.942	44,040	46,750	1.49 x .58 = .864	8.3	.....	.....	.13	.11
4500	3	⅝	2.99	.614	1.836	73,700	40,140	2.98 x .53 = 1.579	14.0	.....	.18	.16	.14
4501	3½	⅝	3.50	.615	2.152	80,650	37,480	3.50 x .53 = 1.855	13.8	.22	.20	.17	.15
4502	3½	⅝	3.50	.616	2.156	79,640	36,940	3.48 x .54 = 1.879	12.9	.25	.22	.18	.16
4503	4	⅝	4.04	.619	2.501	93,300	37,310	4.02 x .54 = 2.171	13.2	.23	.19	.17	.16
4504	1	¾	.98	.678	.664	33,760	50,840	.98 x .67 = .657	1.1	.....	.....	.....	.07
4505	1	¾	1.01	.682	.689	32,100	46,590	1.01 x .66 = .667	3.2	.....	.....	.....	.07
4506	1½	¾	1.49	.688	1.025	47,120	45,970	1.49 x .66 = .983	4.1	.....	.....	.12	.11
4507	3½	¾	3.48	.691	2.405	97,040	40,350	3.47 x .59 = 2.047	14.9	.22	.20	.16	.15
4508	3½	¾	3.53	.692	2.443	96,200	39,380	3.48 x .59 = 2.053	15.9	.24	.22	.18	.17

TENSILE TESTS OF GROOVED WROUGHT-IRON PLATES—Continued.

PUNCHED SPECIMENS.

[Distance between holder-jaws, 4″. Diameter of punch, 1″. Diameter of die, 1 1/16″.]

Elongation in 1″ length.					Appearance of fracture.	Remarks.
C.	1	2	3	4		
Inch.	*Inch.*	*Inch.*	*Inch.*	*Inch.*		
.....	.....	.....	.....	.....	Fibrous lamellar	Test discontinued before specimen separated at fracture.
.08	.08	.....	.....	.....	....do	Fracture open at edges ″.03.
.12	.12	.15	.....	.....	....do	Fracture open at edges ″.07.
.11	.12	.13	.....	.....	....do	Do.
.12	.13	.16	.18	.....	....do	Fracture open at edges ″.12.
.14	.14	.17	.19	.....	Fibrous seamy	Fracture open at edges ″.14.
.13	.15	.18	.20	.....	Fibrous lamellar	Fracture open at edges ″.16.
.....	.....	.....	.....	.....	....do	Test discontinued before specimen separated at fracture.
.13	.14	.17	.19	.20	....do	Fracture open at edges ″.16.
.10	.12	.....	.....	.....	....do	Fracture open at edges ″.03.
.16	.19	.20	.....	.....	....do	Fracture open at edges ″.15.
.12	.14	.16	.....	.....	....do	Fracture open at edges ″.12.
.11	.12	.14	.....	.....	....do	Fracture open at edges ″.10.
.12	.13	.15	.....	.....	....do	Do.
.13	.14	.16	.18	.....	....do	Fracture open at edges ″.14.
.12	.13	.15	.17	.....	....do	Fracture open at edges ″.13.
.15	.16	.19	.21	.....	....do	Fracture open at edges ″.15.
.13	.14	.17	.19	.....	....do	Fracture open at edges ″.16.
.14	.16	.19	.22	.24	....do	Fracture open at edges ″.18.
.14	.15	.17	.20	.22	....do	Fracture open at edges ″.16.
.14	.15	.17	.20	.23	....do	Fracture open at edges ″.20.
.13	.14	.15	.18	.21	Fibrous seamy	Fracture open at edges ″.18.
.....	.....	.....	.....	.....	.....	Test discontinued when load had fell to 20,000 pounds.
.18	.16	.18	.22	.26	Fibrous seamy	Fracture open at edges ″.22.
.08	.09	.....	.....	.....	Fibrous lamellar	Fracture open at edges ″.02.
.10	.10	.....	.....	.....	....do	Fracture open at edges ″.03.
.11	.12	.15	.....	.....	Fibrous seamy	Fracture open at edges ″.04.
.10	.11	.12	.....	.....	Fibrous lamellar	Fracture open at edges ″.07.
.12	.13	.16	.18	.....	....do	Fracture open at edges ″.11.
.14	.16	.18	.20	.22	....do	Fracture open at edges ″.18.
.16	.16	.18	.21	.24	Fibrous, with granular streaks	Fracture open at edges ″.20.
.16	.17	.19	.22	.24	Fibrous lamellar	Fracture open at edges ″.21.
.06	.06	.....	.....	.....	....do	Fractured edges meet. } Specimens
.06	.07	.....	.....	.....	....do	Do. } tested cross-
.14	.11	.12	.....	.....	....do	Fracture open at edges ″.02. } wise the grain.
.14	.15	.18	.21	.23	....do	Fracture open at edges ″.16.
.16	.17	.19	.22	.24	....do	Fracture open at edges ″.20.

TENSILE TESTS OF GROOVED STEEL PLATES.

DRILLED SPECIMENS, 1″ GROOVES.

[Distance between holder jaws, 4″.]

Number of test.	Nominal dimensions.		Actual dimensions.		Sectional area.	Ultimate strength.		Area at fracture.	Contraction of area.	Elongation			
	Width.	Thickness.	Width.	Thickness.		Total.	Pounds per square inch.			4	3	2	1
	In.	*In.*	*Inch.*	*Inch.*	*Sq. in.*	*Pounds.*		*Inches. Sq. in.*	*Perct.*	*In.*	*In.*	*Inch.*	*Inch.*
4509	2	⅜	1.97	.369	.727	46.250	63.620	1.77 x .18 = .319	56.1	.....	.....	.44	.36
4481	1	½	1.00	.498	.498	32.980	66.220	Uncertain	.....	.....	.....	.....	.06
4510	1	½	.99	.495	.490	32.740	66.800	.83 x .28 = .232	52.7	.....	.....	.....	.34
4511	1	½	1.00	.500	.500	33.500	67.000	.87 x .30 = .261	47.8	.....	.....	.....	.31
4512	1½	½	1.53	.497	.760	50.110	65.930	1.39 x .33 = .459	39.6	.....	.....	.40	.33
4513	1½	½	1.50	.498	.747	49.500	66.270	1.32 x .29 = .383	48.7	....	.....	.44	.37
4514	2	½	1.98	.504	.998	67.370	67.510	1.78 x .30 = .534	46.5	.....	.....	.47	.37
4515	2	½	2.03	.502	1.019	68.000	66.730	1.82 x .28 = .510	49.9	.....	.....	.46	.38
4516	2½	½	2.50	.497	1.242	84.400	67.950	2.37 x .32 = .758	38.9	.....	.47	.35	.29
4517	2½	½	2.52	.501	1.263	85.180	67.440	2.32 x .30 = 696	44.9	.....	.52	.41	.33
4518	3	½	3.01	.502	1.511	100.200	66.310	2.86 x .33 = .944	37.5	.....	.50	.39	.32
4519	3	½	3.01	.503	1.514	100.210	66.190	2.84 x .31 = 880	41.9	.....	.52	.40	.33
4520	3½	½	3.49	.504	1.759	114.200	64.920	3.27 x .31 = 1.014	42.3	.66	.50	.40	.35
4521	3½	½	3.50	.502	1.757	114.580	65.210	3.30 x .31 = 1.023	41.8	.64	.50	.39	.34
4522	4	½	3.99	.499	1.991	128.350	64.470	3.78 x .30 = 1.134	43.0	.58	.45	.37	.33
4523	4	½	4.00	.498	1.992	129.100	64.810	3.80 x .33 = 1.254	37.0	.57	.44	.35	.31
4524	4	½	4.00	.503	2.012	130.150	64.690	3.78 x .31 = 1.172	41.7	.61	.47	.38	.34
4525	4	½	4.00	.498	1.992	127.760	64.140	3.80 x .31 = 1.178	40.9	.58	.44	.35	.31
4526	1	⅝	.99	.619	.613	36.960	60.290	.76 x .32 = .243	60.4	.....	.....	.....	.43
4527	1½	⅝	1.49	.614	.915	58.200	63.610	1.32 x .38 = .502	45.1	.....	.....	.47	.38
4528	1½	⅝	1.49	.616	.918	58.250	63.450	1.31 x .37 = .485	47.2	.....	.....	.45	.36
4529	2½	⅝	2.49	.620	1.544	91.360	59.170	2.20 x .33 = .726	53.0	.....	.68	.53	.45
4530	2½	⅝	2.50	.619	1.547	92.200	59.600	2.22 x .31 = .688	55.5	....	.69	.55	.46
4531	3	⅝	3.01	.617	1.857	110.060	59.270	2.73 x .32 = .874	52.9	.....	.65	.51	.44
4532	3½	⅝	3.50	.614	2.149	132.400	61.610	3.20 x .35 = 1.120	47.9	.75	.58	.48	.40
4533	3½	⅝	3.49	.617	2.153	133.620	62.060	3.21 x .35 = 1.124	47.8	.74	.57	.46	.39
4534	4	⅝	4.00	.615	2.460	148.400	60.330	3.74 x .35 = 1.309	46.8	.73	.58	.46	.41
4535	4	⅝	4.01	.617	2.474	151.200	61.120	3.76 x .36 = 1.354	45.2	.74	.58	.47	.41
4536	1	¾	.96	.726	.697	40.760	58.480	.71 x .37 = .263	62.3	.....	.....	.....	.46
4537	1	¾	1.01	.727	.734	43.150	58.790	.75 x .37 = .278	62.1	.....	.....	.....	.47
4538	1½	¾	1.51	.726	1.096	64.980	59.290	1.22 x .35 = .427	61.0	.....	.....	.61	.50
4539	3½	¾	3.50	.736	2.576	151.200	58.700	3.13 x .37 = 1.158	55.0	.86	.67	.55	.48
4540	3½	¾	3.49	.729	2.544	150.550	59.180	3.15 x .39 = 1.229	51.7	.82	.63	.51	.45

TENSILE TESTS OF GROOVED STEEL PLATES.

DRILLED SPECIMENS, 1″ GROOVES.

[Distance between holder jaws, 4″.]

In 1″ length.					Appearance of fracture.	Remarks.
C.	1	2	3	4		
Inch.	*Inch.*	*Inch.*	*Inch.*	*Inch.*		
.34	.36	.45	.....	.....	Fine silky	Fracture open at middle ″.03.
.15	.06	.....	.....	.....	Fine granular	Detached a small piece at fracture.
.31	.34	.....	.....	.....	Fine silky	Fracture open at middle ″.02.
.28	.31	.....	.....	.....	do	Do.
.30	.32	.39	.....	.....	do	Fracture open at one edge ″.03.
.34	.37	.44	.....	.....	do	Fracture open at middle ″.04.
.33	.35	.45	.....	.....	Fine silky 60 per cent.; fine granular 40 per cent.	Do.
.35	.38	.46	.....	.....	Fine silky	Fractured ends meet.
.27	.30	.36	.47	.....	Silky, with slight lamination	Fracture open at one edge ″.10.
.30	.33	.41	.53	.....	Fine silky	Fracture open at edges ″.03.
.30	.33	.39	.50	.....	do	Fracture open at edges ″.14.
.31	.33	.40	.32	.....	do	Fracture open at edges ″.10.
.32	.34	.40	.50	.65	do	Do.
.31	.34	.39	.50	.65	do	Fracture open at edges ″.12.
.31	.32	.36	.45	.58	do	Do.
.29	.31	.35	.44	.57	do	Do.
.32	.33	.39	.47	.61	do	Do.
.29	.31	.37	.46	.59	do	Do.
.40	.43	.....	.....	.....	do	Fracture open at middle ″.03.
.35	.38	.46	.....	.....	do	Fracture open at one edge ″.05.
.34	.36	.45	.....	.....	do	Fracture open at one edge ″.03.
.44	.46	.55	.68	.....	do	Fracture open at edges ″.02.
.44	.47	.55	.69	.....	do	Fracture open at edges ″.03.
.40	.44	.50	.65	.....	do	Fracture open at edges ″.06.
.38	.41	.48	.59	.75	do	Fracture open at edges ″.08.
.37	.39	.46	.59	.74	do	Do.
.38	.41	.46	.58	.73	do	Fracture open at edges ″.16.
.39	.41	.46	.57	.73	do	Do.
.42	.46	.....	.....	.....	Silky, slightly spongy	Fracture open at middle ″.02.
.44	.47	.....	.....	.....	do	Do.
.46	.50	.60	.....	.....	do	Do.
.46	.48	.55	.68	.86	Fine silky	Fracture open at edges ″.08.
.42	.45	.51	.64	.82	do	Fracture open at edges ″.10.

TENSILE TESTS OF GROOVED STEEL PLATES—Continued.

PUNCHED SPECIMENS.

[Distance between holder jaws, 4″. Diameter of punch, 1″; diameter of die, 1 1/16″.]

Number of test.	Nominal dimensions.		Actual dimensions.			Ultimate strength.		Area at fracture.	Contraction of area.	Elongation			
	Width.	Thickness.	Width.	Thickness.	Sectional area.	Total.	Pounds per square inch.			4	3	2	1
	In.	*In.*	*Inch.*	*Inch.*	*Sq. in.*	*Pounds.*		*Inches. Sq. in.*	*Perct.*	*In.*	*In.*	*Inch.*	*Inch.*
4541	2	3/8	1.99	.365	.726	44,930	61,890	1.94 x .24 = .466	35.8	.....	.....	.36	.28
4542	1	3/8	.99	.494	.489	34,270	70,080	.97 x .38 = .369	24.6	.....	.....	.....	.18
4543	1	1/2	1.00	.492	.492	33,520	68,130	Broke .3 eccentric.	.....	.....	.....	.....	.08
4544	1 1/2	1/2	1.50	.497	.745	49,420	66,340	1.43 x .37 = .529	29.0	.....	.....	.35	.28
4545	1 1/2	1/2	1.51	.494	.746	47,600	63,810	Broke 1/4 eccentric	.....	.....	.....	.16	.11
4546	2	1/2	1.99	.499	.993	55,540	55,930	Broke eccentric...	.....	.....	.....	.07	.....
4547	2	1/2	1.97	.500	.985	63,300	64,260	1.96 x .36 = .706	28.3	.....	.....	.29	.23
4548	2 1/2	1/2	2.43	.502	1.220	63,500	52,050	2.41 x .45 = 1.084	11.1	.....	.16	.12	.11
4549	2 1/2	1/2	2.51	.504	1.265	81,410	64,360	2.48 x .42 = 1.042	17.6	.....	.31	.20	.14
4550	3	1/2	3.00	.503	1.509	91,030	60,320	*2.98 x .45 = 1.341	11.1	.....	.20	.13	.08
4551	3	1/2	2.99	.503	1.504	93,900	62,430	Uncertain	.....	....	.27	.18	.14
4552	3 1/2	1/2	3.50	.503	1.760	87,000	49,430	Broke eccentric ..	.....	.18	.....	.07	.06
4553	3 1/2	1/2	3.50	.505	1.767	85,300	48,270	Broke eccentric...	.....	Uncertain.			
4554	4	1/2	4.00	.497	1.988	95,450	48,010	Broke .3 eccentric.	.....	.06	.05	.05	.05
4555	4	1/2	4.00	.499	1.996	110,160	55,190	Broke .2 eccentric.	.....	.19	.14	.12	.10
4556	4	1/2	3.99	.501	1.999	111,500	55,780	*3.97 x .45 = 1.786	10.7	.26	.17	.14	.12
4557	4	1/2	3.99	.498	1.987	91,900	46,250	Broke eccentric...	.....	.11	.....	.....	.06
4558	1	5/8	1.01	.613	.619	41,300	66,720	.93 x .39 = .363	41.3	.....	.....	.....	.31
4559	1 1/2	5/8	1.52	.612	.930	60,260	64,800	1.44 x .44 = .634	31.8	.....	.....	.39	.31
4560	1 1/2	5/8	1.50	.615	.922	59,380	64,400	1.44 x .44 = .634	31.2	.....	.....	.40	.32
4561	2 1/2	5/8	2.50	.618	1.545	89,700	58,060	*2.45 x .42 = 1.029	33.4	.....	.52	.42	.35
4562	2 1/2	5/8	2.52	.619	1.560	91,700	58,780	2.36 x .42 = .991	36.4	.....	.55	.44	.36
4563	3	5/8	2.99	.617	1.845	105,500	57,180	2.94 x .42 = 1.235	33.1	.....	.52	.42	.32
4564	3 1/2	5/8	3.46	.615	2.128	124,300	58,410	3.33 x .39 = 1.299	38.9	.74	.59	.48	.42
4565	2 1/2	5/8	3.51	.615	2.159	123,480	57,190	3.44 x .42 = 1.445	33.1	.59	.49	.40	.35
4566	4	5/8	4.04	.612	2.472	134,600	54,450	3.97 x .43 = 1.707	30.9	.58	.46	.38	.34
4567	4	5/8	4.03	.614	2.474	141,950	57,380	3.97 x .42 = 1.667	32.6	.59	.48	.39	.36
4569	1	3/4	1.01	.721	.728	49,450	67,930	.94 x .49 = .461	36.7	.....	.....	.....	.35
4570	1	3/4	1.00	.718	.718	48,550	67,620	.91 x .42 = .382	46.8	.....	.....	.....	.35
4571	1 1/2	3/4	1.50	.719	1.078	67,800	62,890	1.38 x .47 = .649	39.8	.....	.....	.49	.39
4572	3 1/2	3/4	3.50	.735	2.572	145,900	56,730	Uncertain	.....	.49	.34	.23	.18
4573	3 1/2	3/4	3.51	.733	2.573	139,500	54,220	3.46 x .64 = 2.214	13.9	.30	.18	.12	.09

*Approximately.

TENSILE TESTS OF GROOVED STEEL PLATES—Continued.

PUNCHED SPECIMENS.

[Distance between holders, 4". Diameter of punch, 1"; diameter of die, $1\frac{1}{16}$".]

Elongation in 1" length.					Appearance of fracture.	Remarks.
C.	1.	2	3	4		
Inch.	*Inch.*	*Inch.*	*Inch.*	*Inch.*		
.26	.28	.36	.....	.....	Fine silky	Fracture open at edges ".12.
.16	.18	.....	.....	.....	Silky, slightly granular	Fractured ends meet.
.06	.08	.....	.....	.....	Granular	Do.
.24	.28	.35	.....	.....	Silky, slight granulation	Fracture open at edges ".10.
.06	.10	.16	.....	.....	Granular	Fractured ends meet.
.....	.04	.07	.....	.....	Granular, with hard edges	Fractured from each side, detaching piece from center.
.20	.23	.29	.....	.....	Fine silky	Fracture open at edges ".10.
.10	.11	.12	.15	.....	Granular, radiating from sides	Fracture began at one edge; open at one edge ".06.
.12	.14	.21	.30	.....	Silky at sides, granular center	Fractured ends meet.
.07	.09	.12	.20	.....	Granular, silky at one side	Do.
.13	.14	.19	.27	.....	Silky sides, granular center radiating from silky parts.	..... Small piece detached at fractured from each of these specimens.
.09	.13	.13	.15	.18	Granular, radiating from sides.	Fractured from one edge.
Uncertain.					.....do	.....do
.05	.05	.05	.06	.06	Granular, radiating from side	Fracture open at edges ".02.
.09	.08	.10	.14	.19	Granular, radiating from silky side.	Fractured from one side.
.12	.12	.13	.17	.25	.....do	Fracture open at edges ".09.
.06	.07	.07	.10	.11	Granular, radiating from side	Fractured from one edge.
.28	.31	.....	.....	.....	Fine silky	Fracture open at edges ".03.
.28	.31	.39	.....	.....	Fine silky, with slight granulation.	Fracture open at edges ".10.
.28	.32	.40	.....	.....	Fine silky	Fracture open at edges ".12.
.32	.34	.41	.52	.....	.....do	Fracture open at edges ".20.
.33	.37	.45	.56	.....	.....do	Fracture open at edges ".16.
.30	.33	.40	.52	.....	Silky, laminated	Fracture open at edges ".20.
.40	.40	.46	.59	.73	.....do	Fracture open at edges ".22.
.33	.34	.39	.48	.58	Fine silky	Fracture open at edges ".25.
.33	.36	.41	.48	.58	.....do	Fracture open at edges ".30.
.33	.35	.38	.46	.59	Silky, laminated	Do.
.30	.34	.....	.....	.....	Silky, laminated	Fracture open at edges ".05.
.31	.35	.....	.....	.....	Fine silky	Fracture open at edges ".06.
.35	.39	.49	.....	.....	.....do	Fracture open at edges ".07.
.16	.18	.23	.34	.49	Silky at sides, granular center	Fracture open at edges ".08.
.08	.09	.12	.17	.30	Granular, radiating from silky edge.	Fractured ends meet.

NOTE.—The tests of the punched steel specimens developed small cracks at the sides of the punched grooves, the metal not drawing down evenly.

2 a.

TENSILE TESTS OF RIVETED JOINTS.

SINGLE RIVETED LAP AND BUTT JOINTS $\frac{3}{8}''$–$\frac{3}{4}''$ IRON AND STEEL PLATE.

DESCRIPTION OF TESTS.

These experiments were made upon the same quality of material used in the tests of the grooved iron and steel plates.

The ends of the specimens were secured in the hydraulic jaws of the testing-machine, leaving an exposure of 24″ between them.

Elongations, showing the stretch of the metal and slip of the joint, were taken in a gauged length of 10″.

Joints were machine-riveted, unless otherwise stated in the details of the tests.

In obtaining the net section of plate, the diameter of rivet-hole was deducted if drilled; for punched plates the mean diameter of punch and die was used.

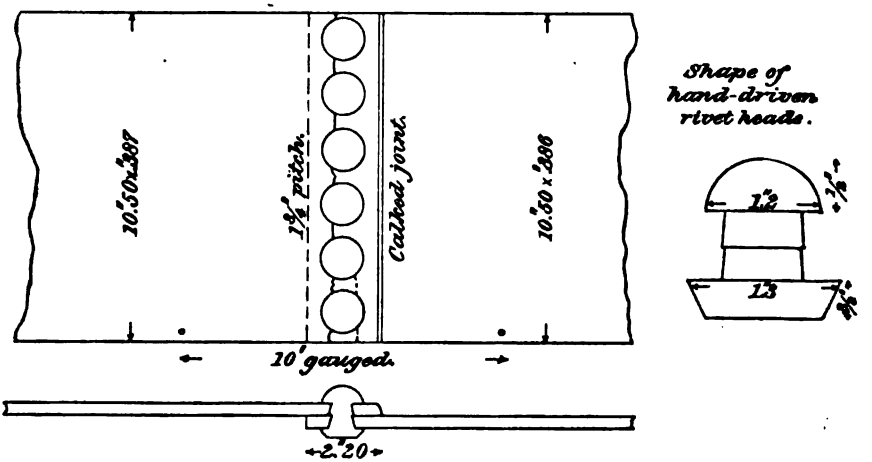
The bearing surface of rivets was computed by using the diameter of drilled holes, or the mean diameter of punch and die, times the number of rivets, times the thickness of plate.

The diameter of the punch was used for the shearing diameter of the rivets.

The efficiency of the joint is found by dividing the maximum tensile stress on the gross sectional area of plate by the tensile strength of material.

IRON PLATE, LAP JOINTS.

No. 4418.—$\frac{3}{8}''$ IRON PLATE. JOINT D D . .



$\frac{11}{16}''$ iron rivets, hand-driven.
Punched holes: Punch, ".753; die, ".774.

1785.

Steel

2.290 dri

5.720 pun

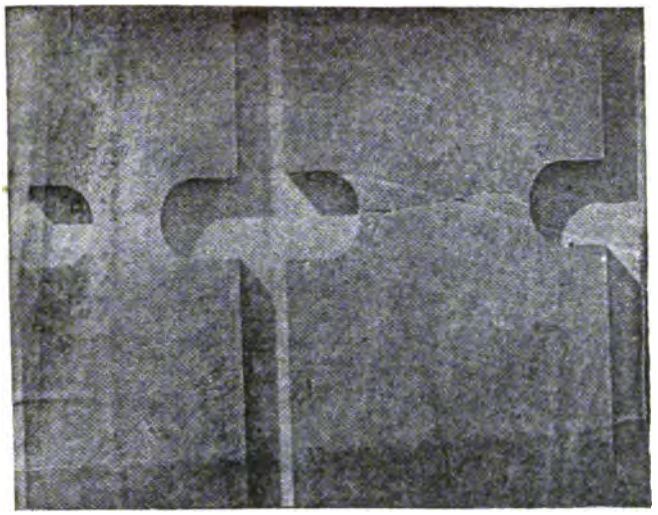
Steel

1.810
.450 dri

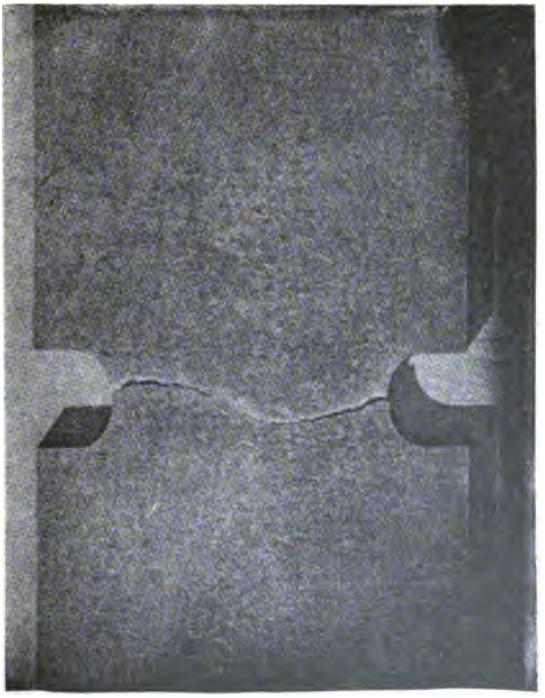
4.800
1400 pun

Steel

PHOTOGRAPHS
OF
DRILLED SPECIMENS.



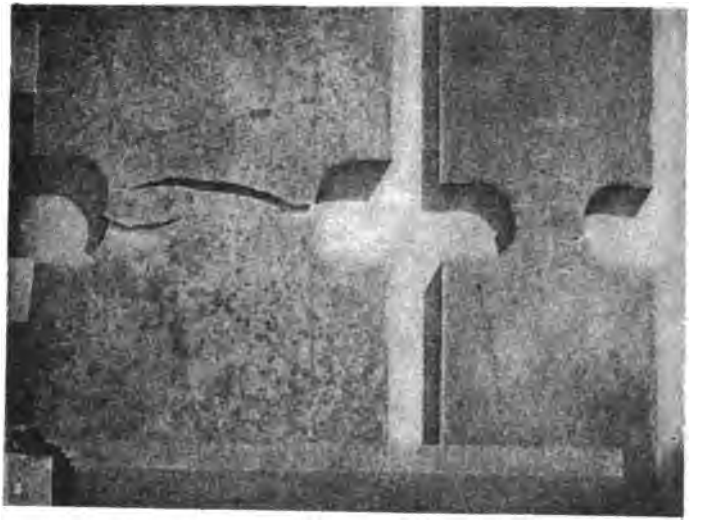
No. 4442. ½" Wrought Iron plate, 1" wide.
No. 4448. ½" Wrought Iron plate, 2½" wide.



PHOTOGRAPHS

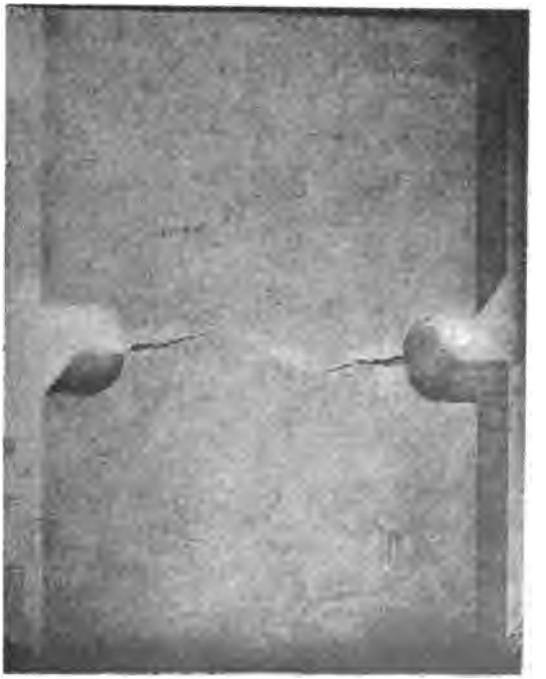
OF

PUNCHED SPECIMENS.



No. 4551. ½" Steel plate, 3" wide.

No. 4471. ⅜" Wrought Iron plate, 1" wide.



PHOTOGRAPH OF No. 4581.

S. Ex. 5, 1, 48.

	Square inches.
Gross sectional area of upper plate	4.06
Net sectional area of upper plate	2.29
Bearing surface of rivets	1.77
Shearing area of rivets	2.67

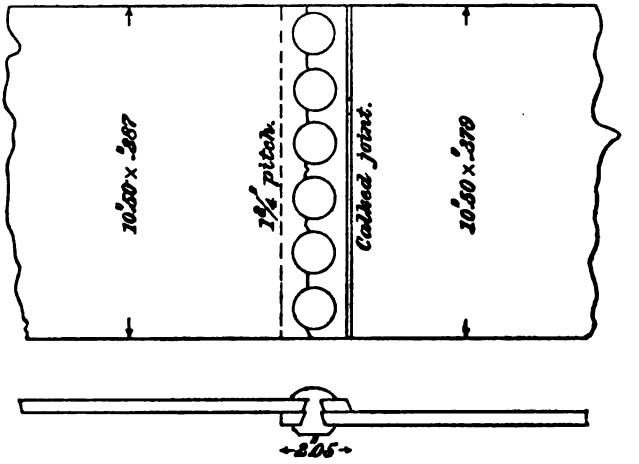
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
20,000	.0030		
30,000	.0062		
35,000	.0087		
5,000		.0028	
35,000	.0090		
40,000	.0112		
42,000	.0129		
44,000	.0142		
46,000	.0155		
48,000	.0171		
50,000	.0190		
5,000		.0091	
55,000	.0230		
60,000	.0300		Joint opens perceptibly.
65,000	.0401		
70,000	.055		
75,000	.09		Joint open ".02.
80,000	.11		
85,000	.14		
90,000	.20		Ultimate strength.

Fractured upper plate across line of rivet holes; also started fractures across two sections in under plate. Appearance of fractures, fibrous centers with granular metal at surface of plate. A seam extended along one edge of upper plate $4\frac{1}{2}'' \times 1\frac{1}{2}''$.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	22.170
Tensile stress on net section of plate	39.300
Compressive stress on bearing surface of rivets	50.850
Shearing stress on rivets	33.710

No. 4419.—$\frac{3}{8}''$ IRON PLATE. JOINT D D.



$\frac{11}{16}''$ iron rivets, hand-driven.
Punched holes: Punch, ".753; die, ".774.

	Square inches.
Gross sectional area of upper plate	4.06
Net sectional area of upper plate	2.29
Bearing surface of rivets	1.77
Shearing area of rivets	2.67

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
15,000	.0017		
20,000	.0026		
25,000	.0038		
30,000	.0050		
35,000	.0068		
5,000		.0020	
36,000	.0070		
38,000	.0076		
40,000	.0083		
42,000	.0092		
44,000	.0102		
46,000	.0112		
48,000	.0128		
50,000	.0140		
5,000		.0060	
52,000	.0150		
54,000	.0162		
56,000	.0180		
58,000	.0193		
60,000	.0210		
62,000	.0237		
64,000	.0260		
66,000	.0290		
68,000	.0331		
70,000	.0398		
72,000	.0441		
74,000	.0530		Joint opens perceptibly.
76,000	.0610		
80,000	.07		
85,000	.09		
90,000	.12		
93,900	.16		Ultimate strength.

Fractured upper plate across line of rivet holes.

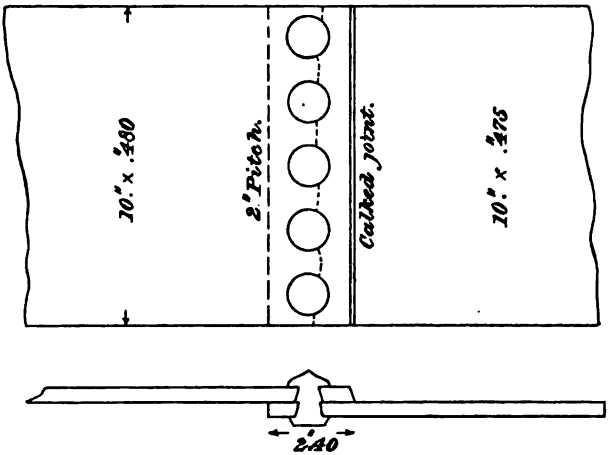
This plate was cut from the same sheet and adjacent to the upper plate of joint D D . No. 4418.

The appearance at fracture was similar to that of No. 4418. It had a seam along the edge $4\frac{1}{2}''$ long by $1\frac{1}{2}''$ wide.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	23,130
Tensile stress on net section of plate	41,000
Compressive stress on bearing surface of rivets	53,050
Shearing stress on rivets	35,170

No. 4428.—½″ IRON PLATE. JOINT A A A A.



⅞″ iron rivets, hand-driven.
Punched holes: Punch, $\frac{15}{16}$″; die, $\frac{29}{32}$″.

	Square inches.
Gross sectional area of under plate	4.75
Net sectional area of under plate	2.71
Bearing surface of rivets	2.04
Shearing area of rivets	2.59

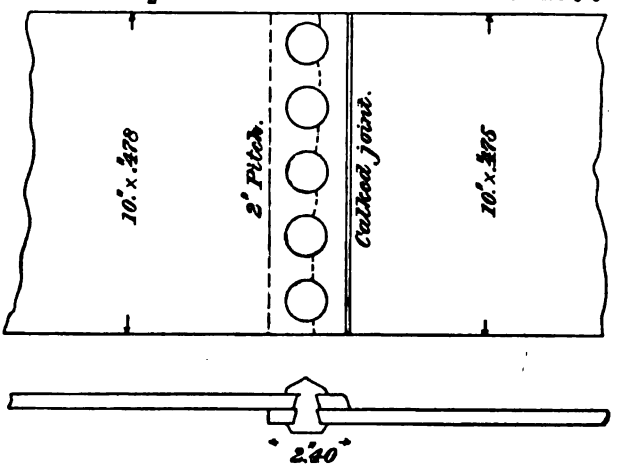
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0010	.....	
15,000	.0015	.....	
20,000	.0021	.....	
25,000	.0031	.....	
30,000	.0045	.....	
35,000	.0061	.....	
5,000	.....	.0018	
36,000	.0067	.....	
38,000	.0075	.....	
40,000	.0085	.....	
42,000	.0097	.....	
44,000	.0109	.....	
46,000	.0121	.....	
48,000	.0135	.....	
50,000	.0151	.....	
5,000	.....	.0071	
52,000	.0168	.....	
54,000	.0182	.....	
56,000	.0199	.....	
58,000	.0221	.....	
60,000	.0252	.....	
62,000	.0290	.....	
64,000	.0390	.....	
66,000	.0451	.....	
68,000	.0515	.....	
70,000	.0580	.....	Joint opened perceptibly.
72,000	.0650	.....	
74,000	.0732	.....	
76,000	.081	.....	
80,000	.09	.....	
85,000	.12	.....	
90,000	.16	.....	
95,000	.20	.....	
96,600	.....	.....	Ultimate strength.

Fractured under plate across line of rivet holes. Appearance of metal fibrous, with slight granulation at surface of plate and in vicinity of punched holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	20.340
Tensile stress on net section of plate	35.650
Compressive stress on bearing surface of rivets	47.350
Shearing stress on rivets	37.300

No. 4429.—½″ IRON PLATE. JOINT A A A A . .



⅞″ iron rivets, hand-driven.
Punched holes: Punch, $\frac{13}{16}$″; die, $\frac{29}{32}$″.

	Square inches.
Gross sectional area of under plate	4.75
Net sectional area of under plate	2.71
Bearing surface of rivets	2.04
Shearing area of rivets	2.59

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
15,000	.0012		
20,000	.0020		
25,000	.0028		
30,000	.0038		
35,000	.0051		
5,000		.0008	
36,000	.0052		
38,000	.0060		
40,000	.0069		
42,000	.0079		
44,000	.0087		
46,000	.0098		
48,000	.0110		
50,000	.0120		
5,000		.0041	
52,000	.0130		
54,000	.0145		
56,000	.0158		
58,000	.0175		
60,000	.0191		
62,000	.0218		
64,000	.0250		
66,000	.0320		Joint opens perceptibly.
68,000	.0440		
70,000	.0580		
72,000	.0602		
74,000	.0688		Joint opens .01″
76,000	.078		
80,000	.09		
85,000	.12		
90,000	.16		
95,000	.21		
95,250			Ultimate strength.

Fractured under plate across line of rivet holes.

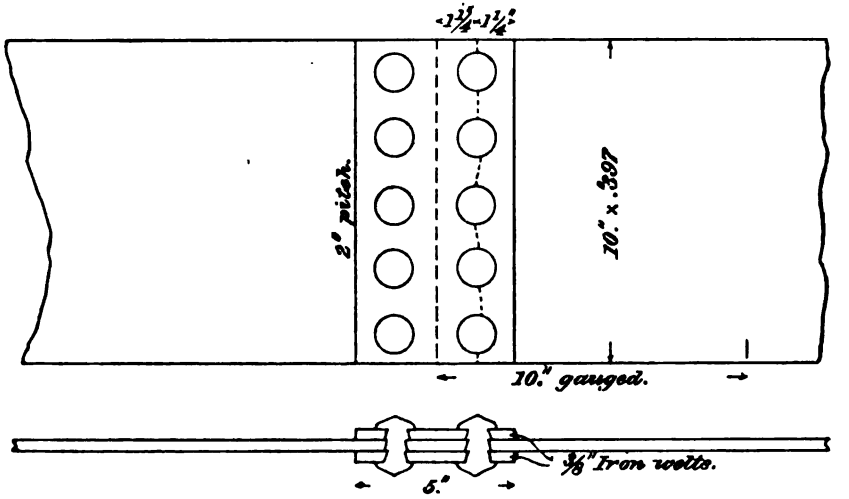
Appearance of metal fibrous, with slight granulation in vicinity of punched holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	20.050
Tensile stress on net section of plate	35.150
Compressive stress on bearing surface of rivets	46.690
Shearing stress on rivets	36.780

IRON PLATE, BUTT JOINTS.

No. 764.—$\frac{3}{8}$″ IRON PLATE. JOINT L.



$\frac{11}{16}$″ iron rivets.

Punched holes: Punch, $\frac{3}{4}$″; die, $\frac{13}{16}$″.

	Square inches.
Gross sectional area of plate	3.97
Net sectional area of plate	2.42
Bearing surface of rivets	1.55
Shearing area of rivets	4.42

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	0.	.....	
20,000	.0008	.....	
30,000	.0020	.....	
35,000	.0023	.....	
5,000	.....	.0003	
40,000	.0030	.....	
45,000	.0033	.....	
50,000	.0040	.....	
55,000	.0061	.....	
60,000	.0075	.....	
65,000	.0090	.....	
70,000	.0102	.....	
75,000	.0112	.....	
80,000	.0126	.....	
85,000	.0140	.....	
90,000	.0150	.....	
95,000	.0168	.....	
100,000	.0190	.....	
110,000	.03	.....	
112,200	.....	.....	Ultimate strength.

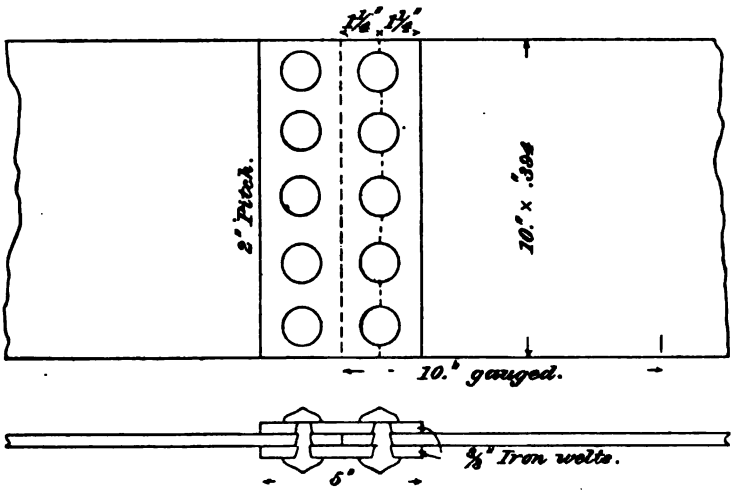
Fractured plate across line of rivet holes.

Maximum loads on joints.

	Pounds per sq. inch.
Tensile stress on gross section of plate	28.260
Tensile stress on net section of plate	46.360
Compressive stress on bearing surface of rivets	72.390
Shearing stress on rivets	25.380

Efficiency of joint, 59.9 per cent.

No. 765.—⅜″ Iron Plate. Joint L..



$\frac{11}{16}$″ iron rivets.
Punched holes: Punch, ¾″; die, $1\frac{3}{16}$.

	Square inches.
Gross sectional area of plate	3.94
Net sectional area of plate	2.40
Bearing surface of rivets	1.54
Shearing area of rivets	4.42

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0003		
20,000	.0009		
30,000	.0020		
35,000	.0027		
5,000		.0005	
35,000	.0027		
40,000	.0031		
50,000	.0049		
60,000	.0069		
70,000	.0091		
80,000	.0117		
85,000	.0130		
90,000	.0149		
95,000	.0165		
100,000	.0190		
110,000	.02½		
112,500			Ultimate strength.

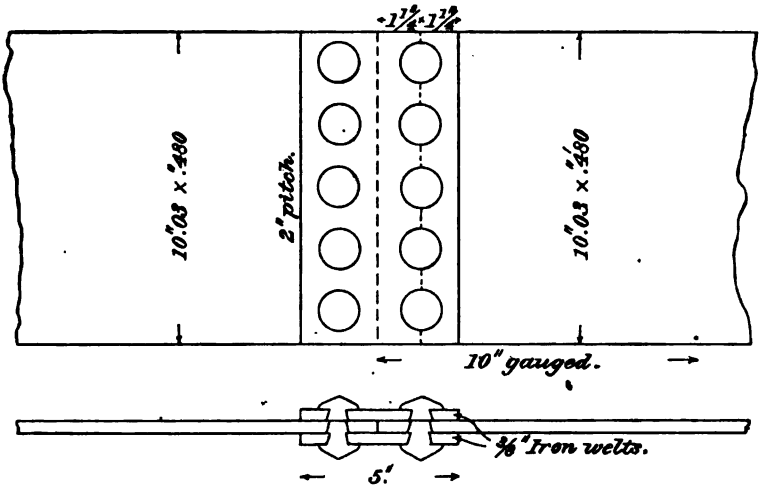
Fractured plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	28.550
Tensile stress on net section of plate	46.875
Compressive stress on bearing surface of rivets	73.050
Shearing stress on rivets	25.450

Efficiency of joint, 60.5 per cent.

No. 768.—½″ Iron Plate. Joint D.



¾″ iron rivets.
Punched holes: Punch, $\frac{13}{16}$″; die, $\frac{29}{32}$″.

	Square inches
Gross sectional area of plate	4.81
Net sectional area of plate	2.75
Bearing surface of rivets	2.06
Shearing area of rivets	5.18

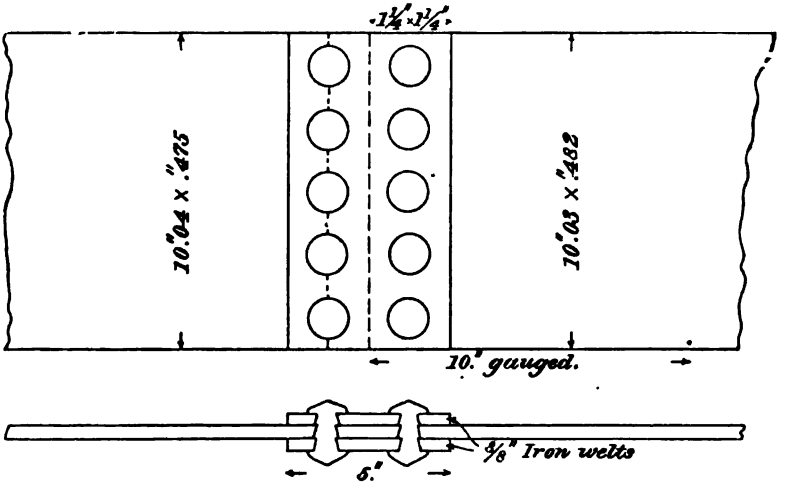
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0003	.....	
20,000	.....	.....	
30,000	.0018	.....	
35,000	.0021	.....	
5,000	.0020	.0002	
35,000	.0026	.....	
40,000	.0050	.....	
50,000	.0072	.....	
60,000	.0095	.....	
70,000	.0110	.....	
80,000	.0130	.....	
90,000	.0150	.....	
100,000	.0176	.....	
110,000	.022	.....	
120,000	.....	.....	
125,500	.....	.....	Snapping sounds.
127,600	.....	.....	Ultimate strength.

Fractured plate across line of rivet holes.
Metal fibrous lamellar with an occasional granular spot near punched holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	26,530
Tensile stress on net section of plate	46.400
Compressive stress on bearing surface of rivets	61.940
Shearing stress on rivets	24.630

No. 769.—½″ Iron Plate. Joint D . .



¾″ iron rivets.
Punched holes: Punch, $\frac{13}{16}$″; die, $\frac{29}{32}$″.

	Square inches.
Gross sectional area of plate	4.77
Net sectional area of plate	2.73
Bearing surface of rivets	2.04
Shearing area of rivets	5.18

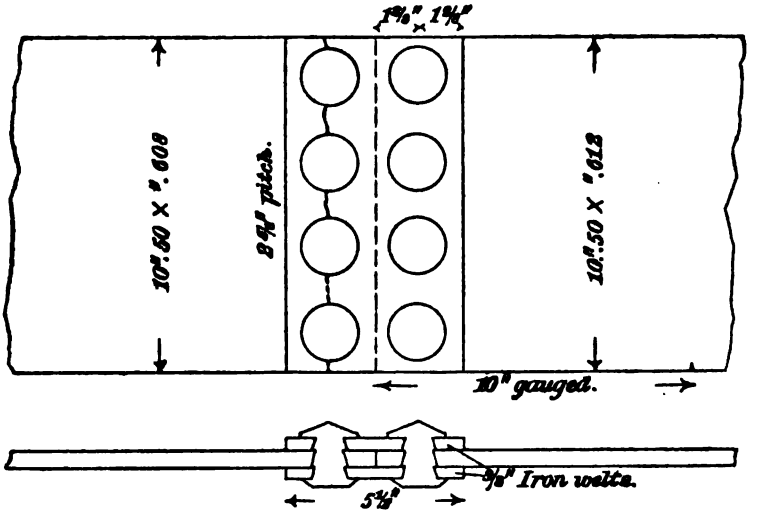
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0007		
20,000	.0016		
30,000	.0023		
35,000	.0029		
5,000		.0002	
35,000	.0029		
40,000	.0036		
50,000	.0060		
60,000	.0080		
70,000	.0100		
80,000	.0120		
90,000	.0141		
100,000	.0200		
5,000		.0107	
10,000	.0110		
20,000	.0120		
30,000	.0130		
40,000	.0140		
50,000	.0150		
60,000	.0160		
70,000	.0170		
80,000	.0181		
90,000	.0192		
125,950			Ultimate strength.

Fractured plate across line of rivet holes.
Metal fibrous, lamellar, granular lines, and at punched holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	26.400
Tensile stress on net section of plate	46.140
Compressive stress on bearing surface of rivets	61.740
Shearing stress on rivets	24.310

No. 772.—$\frac{5}{8}$″ Iron Plate. Joint D.



1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″; die, $1\frac{5}{32}$″.

	Square inches.
Gross sectional area of plate	6.38
Net sectional area of plate	3.68
Bearing surface of rivets	2.70
Shearing area of rivets	7.06

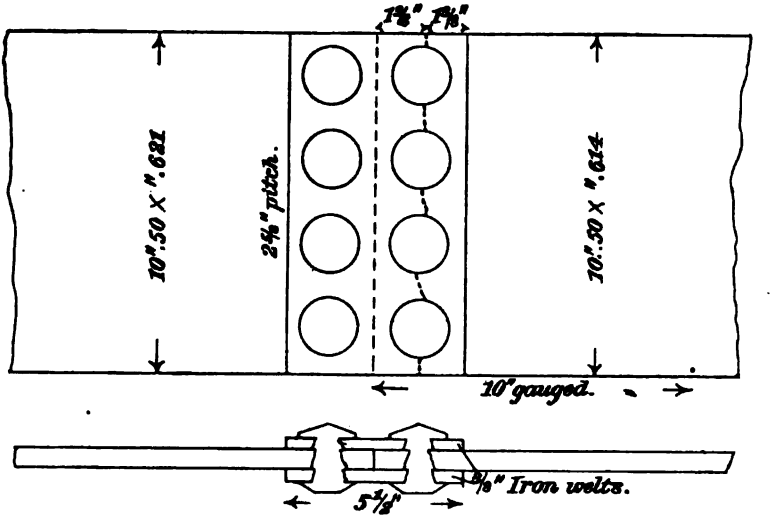
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0001	.....	
20,000	.0008	.....	
30,000	.0014	.....	
35,000	.0018	.....	
5,000	.....	.0004	
40,000	.0021	.....	
50,000	.0030	.....	
60,000	.0041	.....	
70,000	.0058	.....	
80,000	.0069	.....	
90,000	.0080	.....	
100,000	.0100	.....	
110,000	.0116	.....	
120,000	.0133	.....	
130,000	.0152	.....	
140,000	.02½	.....	
150,000	.05½	.....	Snapping sounds.
160,000	.08½	.....	
162,900	.....	.....	Ultimate strength.

Fractured plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	25,530
Tensile stress on net section of plate	44,260
Compressive stress on bearing surface of rivets	60,330
Shearing stress on rivets	23,010

No. 773.—$\frac{5}{8}$″ Iron Plate. Joint D . .



1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″; die, $1\frac{5}{32}$″.

	Square inches.
Gross sectional area of plate	6.45
Net sectional area of plate	3.73
Bearing surface of rivets	2.72
Shearing area of rivets	7.06

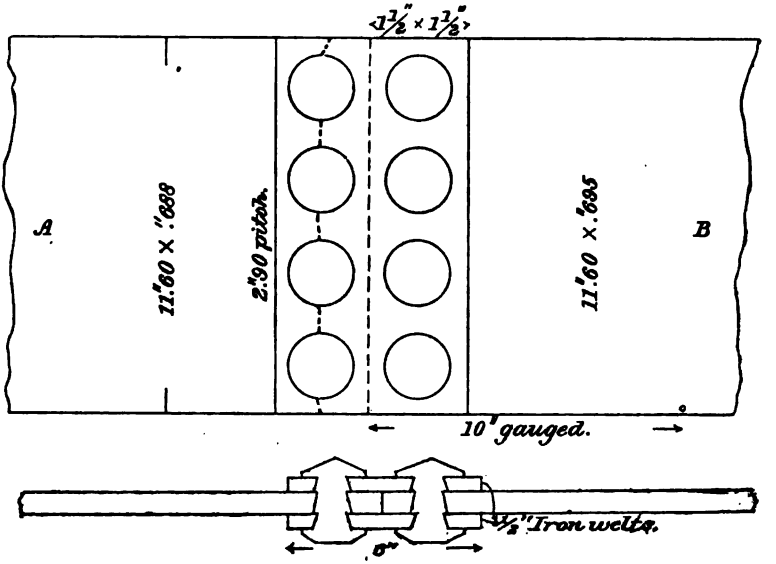
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0001		
20,000	.0008		
30,000	.0011		
35,000	.0016		
5,000		0.	
35,000	.0016		
40,000	.0020		
50,000	.0025		
60,000	.0030		
70,000	.0041		
5,000		.0006	
70,000	.0041		
80,000	.0060		
90,000	.0079		
100,000	.0098		
110,000	.0120		
120,000	.0141		
130,000	.0180		
140,000	.03½		
150,000	.07		
157,980			Ultimate strength.

Fractured plate across line of rivet holes.
Metal fibrous, lamellar, with slight granulation at sides of punched holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	24.490
Tensile stress on net section of plate	42.350
Compressive stress on bearing surface of rivets	58.080
Shearing stress on rivets	22.310

No. 776.—¾″ Iron Plate. Joint D.



1⅛″ iron rivets, hand-driven.
Punched holes: Punch, 1 3/16″; die, 1 9/32″.

	Square inches.
Gross sectional area of plate	7.98
Net sectional area of plate	4.58
Bearing surface of rivets	3.40
Shearing area of rivets	8.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0001	.....	
20,000	.0006	.....	
30,000	.0010	.....	
35,000	.0012	.....	
5,000	.....	0.	
35,000	.0012	.....	
40,000	.0016	.....	
50,000	.0020	.....	
60,000	.0028	.....	
70,000	.0031	.....	
5,000	.....	.0003	
70,000	.0031	.....	
80,000	.0040	.....	
90,000	.0051	.....	
100,000	.0080	.....	
110,000	.0100	.....	
120,000	.0128	.....	
130,000	.0150	.....	
140,000	.0175	.....	
150,000	.0200	.....	
160,000	.0248	.....	
170,000	.06	.....	Snapping sound.
180,000	.08	.....	
190,000	.09½	.....	
198,800	.....	.....	Ultimate strength.

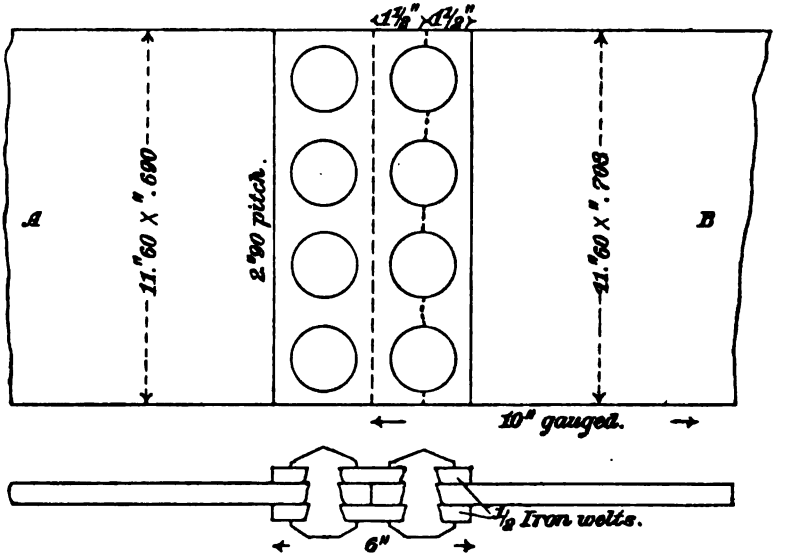
Fractured plate A across line of rivet holes.

Metal granular at one end section and slight granulation next rivet holes; otherwise fibrous.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	24.290
Tensile stress on net section of plate	42,310
Compressive stress on bearing surface of rivets	57.000
Shearing stress on rivets	21.870

No. 777.—$\frac{3}{4}$″ IRON PLATE. JOINT D . .



$1\frac{1}{8}$″ iron rivets, hand-driven.

Punched holes: Punch, $1\frac{3}{16}$″; die, $1\frac{3}{32}$″.

	Square inches.
Gross sectional area of plate	8.15
Net sectional area of plate	4.68
Bearing surface of rivets	3.47
Shearing area of rivets	8.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	0.		
30,000	.0010		
50,000	.0025		
70,000	.0040		
5,000	.....	.0008	
70,000	.0040		
80,000	.0050		
90,000	.0061		
100,000	.0075		
110,000	.0088		
120,000	.0100		
130,000	.0120		
140,000	.0130		
150,000	.0151		
160,000	.0171		
170,000	.0210		
180,000	.06		
190,000	.08½		
196,200	.....		Ultimate strength.

Fractured plate B across line of rivet holes.

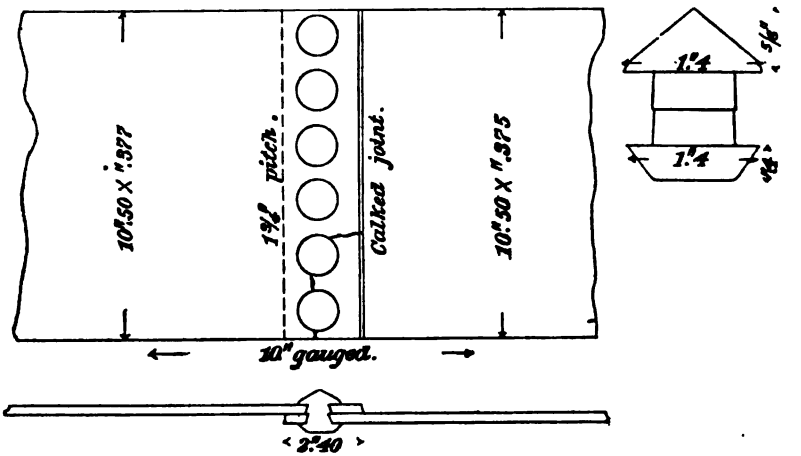
Metal fibrous with slight granulation. Slightly granular next rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	24.073
Tensile stress on net section of plate	41.920
Compressive stress on bearing surface of rivets	56.540
Shearing stress on rivets	22.140

STEEL PLATE, LAP JOINTS.

No. 4420.—$\frac{3}{8}$″ STEEL PLATE. JOINT M.



$\frac{3}{4}$″ iron rivets, hand-driven.

Punched holes: Punch, $\frac{13}{16}$″; die, $\frac{7}{8}$″.

	Square inches.
Gross sectional area of upper plate	3.96
Net sectional area of upper plate	2.05
Bearing surface of rivets	1.91
Shearing area of rivets	3.11

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0010	.....	
15,000	.0020	.....	
20,000	.0031	.....	
25,000	.0042	.....	
30,000	.0060	.....	
35,000	.0071	.....	
5,000	.....	.0014	
36,000	.0078	.....	
38,000	.0083	.....	
40,000	.0091	.....	
42,000	.0100	.....	
44,000	.0110	.....	
46,000	.0117	.....	
48,000	.0128	.....	
50,000	.0135	.....	
5,000	.....	.0050	
52,000	.0147	.....	
54,000	.0157	.....	
56 000	.0166	.....	
58,000	.0178	.....	

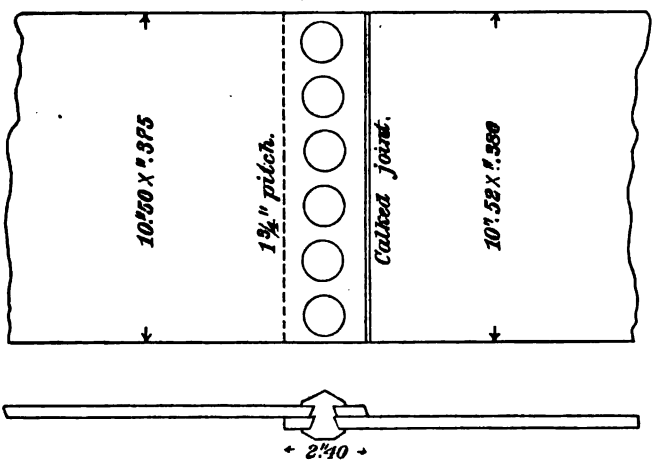
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
62,000	.0204	.....	
64,000	.0218	.....	
66,000	.0235	.....	
68,000	.0249	.....	
70,000	.0266	.....	
72,000	.0285	.....	Joint open ".01.
74,000	.0305	.....	
76,000	.0348	.....	
78,000	.0448	.....	
80,000	.052	.....	
85,000	.07	.....	
90,000	.08	.....	
95,000	.10	.....	
100,000	.13	.....	
105,000	.14	.....	
110,000	.17	.....	
115,000	.19	.....	
120,000	.22	.....	
125,000	.27	.....	
125,600	.....	.....	Ultimate strength.

Sheared four rivets. Fractured upper plate across two sections. Appearance of fractured steel fine granular. Elongation of rivet holes, under plate, ".05; upper plate, ".05.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	31.720
Tensile stress on net section of plate	61.270
Compressive stress on bearing surface of rivets	65.760
Shearing stress on rivets	40.390

No. 4427.—$\frac{3}{8}$" Steel Plate. Joint M . .



$\frac{3}{4}$" iron rivets, hand-driven.
Punched holes: Punch, $\frac{13}{16}$"; die, $\frac{7}{8}$.

	Square inches.
Gross sectional area of upper plate	3.94
Net sectional area of upper plate	2.04
Bearing surface of rivets	1.90
Shearing area of rivets	3.11

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0016	.....	
15,000	.0029	.....	
20,000	.0041	.....	
25,000	.0057	.....	
30,000	.0070	.....	
35,000	.0085	.....	
5,000	.....	.0009	
36,000	.0086	.....	
38,000	.0092	.....	
40,000	.0101	.....	
42,000	.0110	.....	
44,000	.0121	.....	
46,000	.0131	.....	
48,000	.0145	.....	
50,000	.0160	.....	
5,000	.....	.0059	
52,000	.0175	.....	
54,000	.0190	.....	
56,000	.0207	.....	
58,000	.0220	.....	
60,000	.0230	.....	Joint opens perceptibly.
62,000	.0245	.....	
64,000	.0258	.....	
66,000	.0273	.....	
68,000	.0290	.....	
70,000	.0308	.....	
72,000	.0328	.....	
74,000	.0350	.....	
76,000	.0380	.....	
78,000	.0418	.....	
80,000	.0460	.....	
82,000	.0530	.....	
84,000	.0580	.....	
86,000	.065	.....	
90,000	.07	.....	
95,000	.09	.....	
100,000	.11	.....	
105,000	.14	.....	
110,000	.16	.....	
115,000	.19	.....	
118,200	.21	.....	
120,000	.23	.....	
124,100	.....	.....	Ultimate strength.

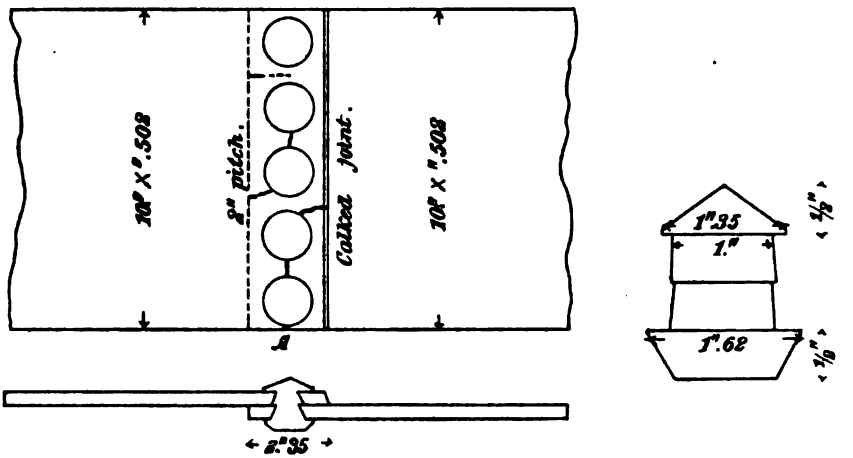
Sheared six rivets.

Elongation of rivet holes, upper plate, about ".07; under plate, ".06.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	31,500
Tensile stress on net section of plate	60,830
Compressive stress on bearing surface of rivets	65,320
Shearing stress on rivets	39,900

No. 4430.—½ STEEL PLATE. JOINT A A A.



$\frac{15}{16}$" iron rivets, hand-driven.
Punched holes: Punch, 1"; die, $1\frac{1}{16}$".

	Square inches.
Gross sectional area of plate	5.02
Net sectional area of plate	2.43
Bearing surface of rivets	2.59
Shearing area of rivets	3.93

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
15,000	.0010		
20,000	.0018		
25,000	.0028		
30,000	.0035		
36,000			
38,000	.0060		
40,000	.0066		
42,000	.0071		
44,000	.0081		
46,000	.0090		
48,000	.0100		
50,000	.0110		
5,000		.0046	
52,000	.0121		
54,000	.0132		
56,000	.0150		
58,000	.0165		
60,000	.0181		
62,000	.0200		
64,000	.0212		
66,000	.0238		
68,000	.0265		
70,000	.0288		
72,000	.0311		
74,000	.0340		
76,000	.0370		
78,000	.0408		
80,000	.0448		
82,000	.0495		
84,000	.0546		Joint open ".01
86,000	.0632		
88,000	.0708		
90,000	.0778		
95,000	.09		
100,000	.11		
105,000	.13		
115,500			Ultimate strength.

Fractured upper plate across first and second sections from edge; fractured lower plate across third section, shearing out piece. Sheared one rivet.

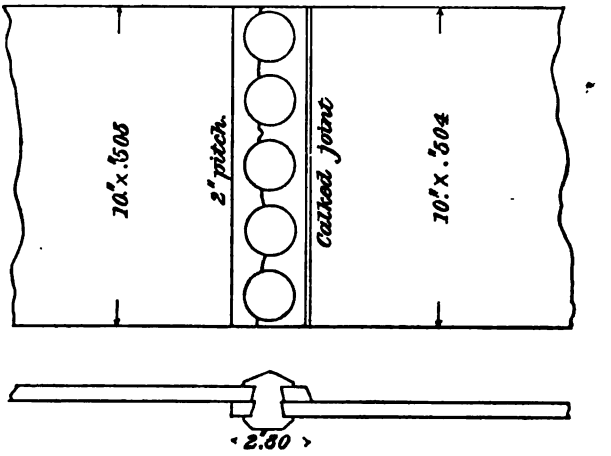
Appearance of fractures in steel plate granular, radiating from rivet holes.

Fractured in detail, beginning at Edge A under 105,000 lbs. tension.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	23,010
Tensile stress on net section of plate	47,530
Compressive stress on bearing surface of rivets	44,590
Shearing stress on rivets	29,390

No. 4431.—½″ STEEL PLATE. JOINT A A A . .



$\frac{15}{16}$″ iron rivets, hand-driven.

Punched holes: Punch, 1″; die, $1\frac{1}{16}$″.

	Square inches.
Gross sectional area of upper plate	5.05
Net sectional area of upper plate	2.45
Bearing surface of rivets	2.60
Shearing area of rivets	3.93

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0010	.....	
15,000	.0012	.....	
20,000	.0020	.....	
25,000	.0030	.....	
30,000	.0040	.....	
35,000	.0051	.....	
5,000	.....	.0009	
50,000	.0112	.....	
55,000	.0142	.....	
60,000	.0178	.....	
62,000	.0195	.....	
64,000	.0215	.....	
66,000	.0238	.....	
68,000	.0260	.....	
70,000	.0288	.....	Joint opens perceptibly.
72,000	.0318	.....	
74,000	.0346	.....	
76,000	0.0376	.....	
78,000	.0418	.....	
80,000	.0465	.....	
82,000	.0508	.....	
84,000	.0562	.....	
86,000	.0630	.....	
88,000	.0690	.....	
90,000	.0760	.....	
95,000	.09	.....	
100,000	.11	.....	
105,000	.13	.....	
110,000	.16	.....	
115,000	.18	.....	
120,000	.22	.....	
122,100	.....	.....	Ultimate strength.

Fractured suddenly with loud report, across line of rivet holes in upper plate. Appearance granular, radiating from rivet holes.

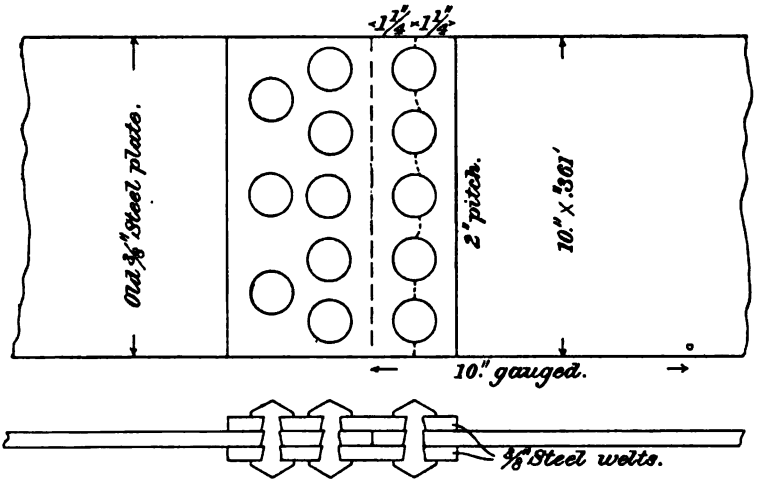
No contraction of area.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	24.180
Tensile stress on net section of plate	49.840
Compressive stress on bearing surface of rivets	46.960
Shearing stress on rivets	31.070

STEEL PLATE BUTT JOINTS.

No. 766.—⅜″ Steel Plate. Joint L.



11/16″ iron rivets.
Punched holes: Punch, ¾″; die, 13/16″.

	Square inches.
Gross sectional area of plate	3.61
Net sectional area of plate	2.20
Bearing surface of rivets	1.41
Shearing area of rivets	4.42

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0006		
20,000	.0013		
30,000	.0028		
35,000	.0035		
5,000		.0005	
35,000	.0035		
40,000	.0041		
50,000	.0069		
60,000	.0100		
70,000	.0125		
80,000	.0151		
85,000	.0168		
90,000	.0182		
95,000	.0205		
100,000	.0238		
110,000	.04		
120,000	.06		
130,000	.30		
138,100			Ultimate strength.

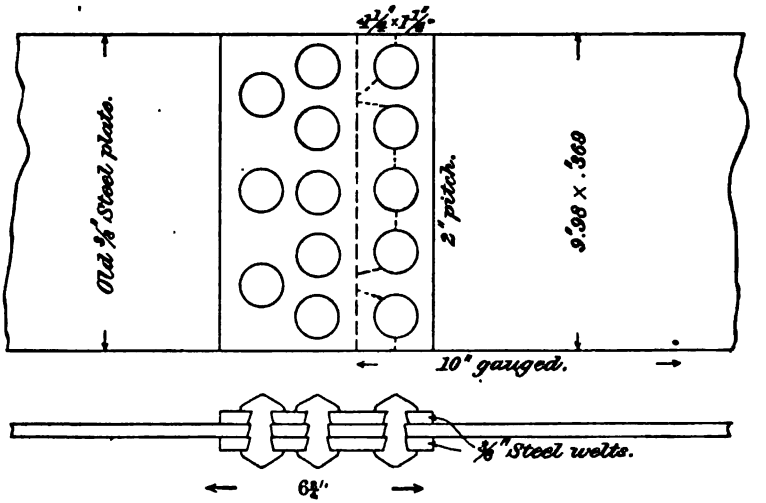
Fractured plate across line of rivets.
Silky fractures; metal well drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	38.240
Tensile stress on net section of plate	62.770
Compressive stress on bearing surface of rivets	97.940
Shearing stress on rivets	31.240

Efficiency of joint, 71.7 per cent.

No. 767.—⅜″ STEEL PLATE. JOINT L.



$\frac{11}{16}$″ iron rivets.
Punched holes: Punch, ¾″; die, $\frac{13}{16}$″.

	Square inches.
Gross sectional area of plate	3.68
Net sectional area of plate	2.24
Bearing surface of rivets	1.44
Shearing area of rivets	4.42

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0008	.....	
20,000	.0020	.....	
30,000	.0031	.....	
35,000	.0040	.....	
5,000	.....	.0006	
35,000	.0040	.....	
40,000	.0050	.....	
50,000	.0068	.....	
60,000	.0085	.....	
70,000	.0110	.....	
80,000	.0136	.....	
90,000	.0170	.....	
100,000	.0220	.....	
110,000	.05	.....	
120,000	.10	.....	
130,000	.35	.....	
137,100	.....	.....	Ultimate strength.

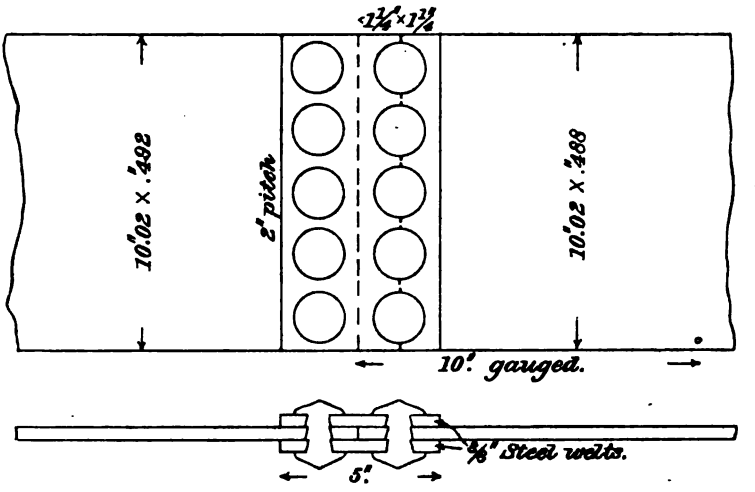
Fractured plate across line of rivet holes, two sections shearing out. Fractures silky; metal well drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	37.260
Tensile stress on net section of plate	61.210
Compressive stress on bearing surface of rivets	95.210
Shearing stress on rivets	31.020

Efficiency of joint, 69.8 per cent.

No. 770.—½″ Steel Plate. Joint D.



$\frac{15}{16}$″ steel rivets.
Punched holes: Punch, 1″; die, $1\frac{1}{64}$″.

	Square inches.
Gross sectional area of plate	4.89
Net sectional area of plate	2.32
Bearing surface of rivets	2.57
Shearing area of rivets	7.85

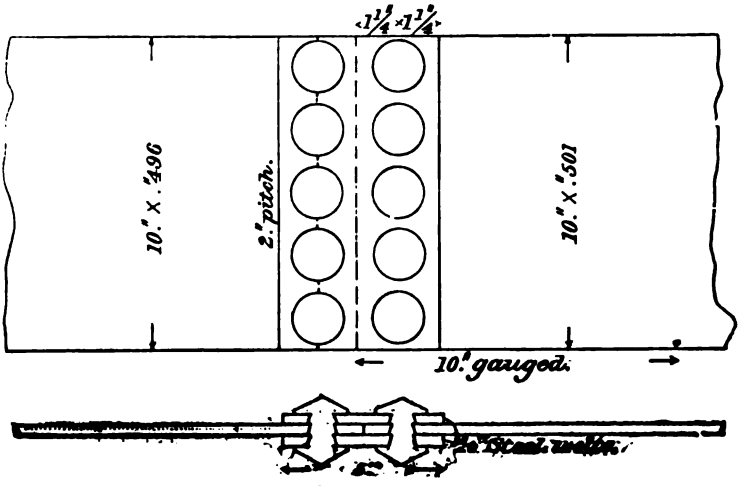
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0008	.....	
20,000	.0017	.....	
30,000	.0030	.....	
35,000	.0039	.....	
5,000	.....	.0011	
35,000	.0039	.....	
40,000	.0053	.....	
45,000	.0064	.....	
50,000	.0070	.....	
55,000	.0078	.....	
60,000	.0081	.....	
65,000	.0090	.....	
70,000	.0098	.....	
75,000	.0105	.....	
80,000	.0110	.....	
90,000	.0122	.....	
100,000	.0138	.....	
110,000	.0155	.....	
120,000	.0180	.....	
130,000	.0220	.....	
140,000	.03	.....	
150,000	.06	.....	
159,900	.....	.....	Ultimate strength.

Fractured suddenly across line of rivet holes. Appearance granular, radiating from rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	32.690
Tensile stress on net section of plate	68.920
Compressive stress on bearing surface of rivets	62.220
Shearing stress on rivets	20.370

No. 771.—½″ Steel Plate. Joint D . .



$\frac{15}{16}$″ steel rivets.
Punched holes: Punch, 1″; die, $1\frac{7}{16}$″.

	Square inches.
Gross sectional area of plate	4.96
Net sectional area of plate	2.34
Bearing surface of rivets	2.62
Shearing area of rivets	7.85

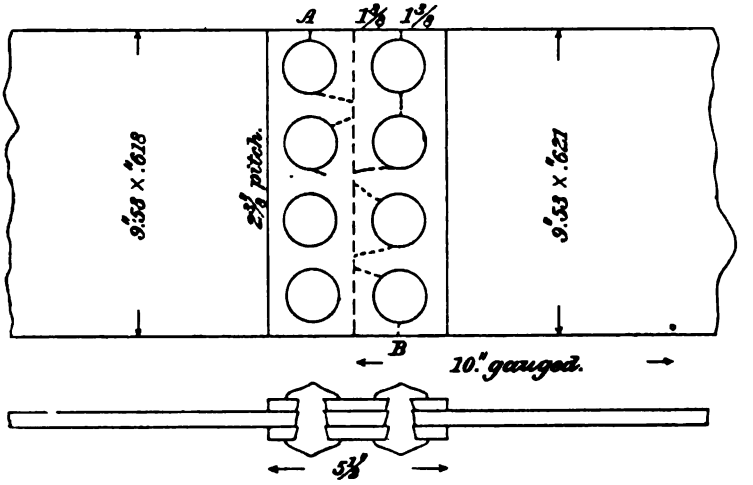
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0002	.....	
20,000	.0011	.....	
30,000	.0020	.....	
35,000	.0026	.....	
5,000	.....	.0005	
35,000	.0026	.....	
40,000	.0030	.....	
50,000	.0043	.....	
60,000	.0068	.....	
70,000	.0080	.....	
80,000	.0096	.....	
90,000	.0110	.....	
100,000	.0125	.....	
110,000	.0141	.....	
120,000	.0158	.....	
130,000	.02	.....	
140,000	.04	.....	
150,000	.05	.....	
156,100	.....	.....	Ultimate strength.

Fractured across line of rivet holes. The two middle and two outside sections, fine granular fractures, radiating from rivet holes.
Two sections, second and fifth, silky, with metal well drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	31.470
Tensile stress on net section of plate	66.710
Compressive stress on bearing surface of rivets	59.580
Shearing stress on rivets	19.890

No. 774.—⅝″ Steel Plate. Joint D.



1″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″; die, $1\frac{5}{32}$″.

	Square inches.
Gross sectional area of plate	5.91
Net sectional area of plate	3.16
Bearing surface of rivets	2.75
Shearing area of rivets	7.08

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	0.		
20,000	.0007		
30,000	.0011		
35,000	.0016		
5,000		0.	
35,000	.0016		
40,000	.0020		
50,000	.0028		
60,000	.0038		
70,000	.0054		
5,000		.0013	
70,000	.0055		
80,000	.0073		
90,000	.0090		
100,000	.0110		
110,000	.0125		
120,000	.0141		
130,000	.0160		
140,000	.02⅛		
150,000	.03		
160,000	.04		
170,000	.08		
180,000	.11½		
190,000	.20		
196,500			Ultimate strength.

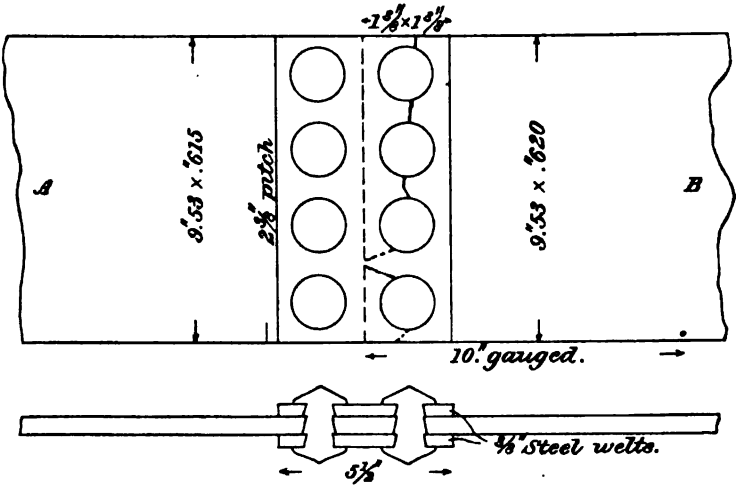
Plates fractured at A and B, the fractures extending towards the center of the specimen.

Strains continued till Plate B was fractured across its width, the metal shearing out in front of rivet holes; and in three sections, failing by tension. Appearance, silky; metal well drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	33.250
Tensile stress on net section of plate	62.180
Compressive stress on bearing surface of rivets	71.450
Shearing stress on rivets	27.750

No. 775.—$\frac{5}{8}$″ Steel Plate. Joint D . .



1″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″; die, $1\frac{5}{32}$″.

	Square inches.
Gross sectional area of plate	5.91
Net sectional area of plate	3.16
Bearing surface of rivets	2.75
Shearing area of rivets	7.08

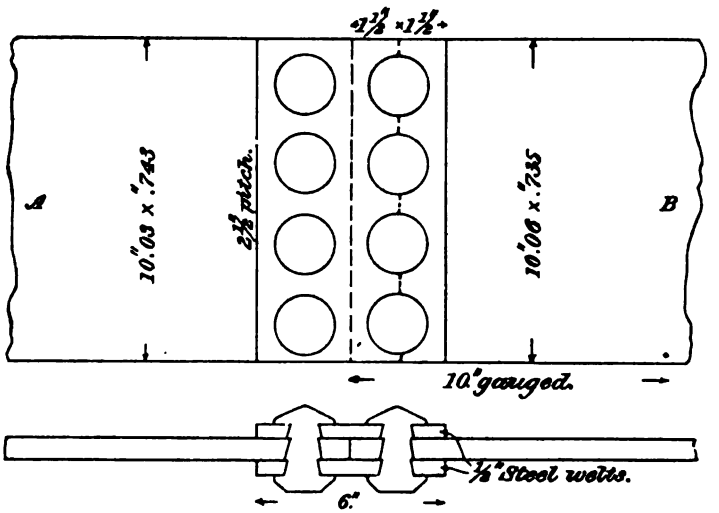
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0001		
20,000	.0008		
30,000	.0017		
35,000	.0020		
5,000		0.	
35,000	.0020		
40,000	.0026		
50,000	.0036		
60,000	.0042		
70,000	.0052		
5,000		.0009	
70,000	.0052		
80,000	.0068		
90,000	.0080		
100,000	.0096		
110,000	.0112		
120,000	.0130		
130,000	.0152		
140,000	.0182		
150,000	.0221		
160,000	.03		
170,000	.05½		
180,000	.10		
190,000	.30		
197,800			Ultimate strength.

Fractured plate *B*. First and third sections have silky appearance; metal well drawn down. Second section tore out front of rivets. Fourth and fifth sections broke square off with granular fracture radiating from rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	33,470
Tensile stress on net section of plate	62,590
Compressive stress on bearing surface of rivets	71,930
Shearing stress on rivets	27,940

No. 778.—¾″ Steel Plate. Joint D..



1⅛″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{3}{16}$″; die, $1\frac{2}{32}$″.

	Square inches.
Gross sectional area of plate	7.39
Net sectional area of plate	3.76
Bearing surface of rivets	3.63
Shearing area of rivets	8.86

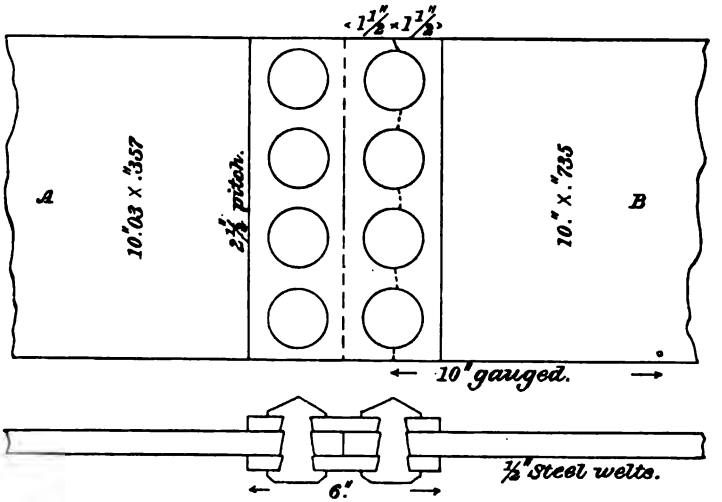
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0001		
30,000	.0011		
50,000	.0029		
70,000	.0050		
150,000	.03½		
160,000	.04½		
170,000	.05		
180,000	.05		
190,000	.05½		
200,000	.07		
205,500			Ultimate strength.

Fractured plate *B* across line of rivet holes.
Granular appearance radiating from rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile stress on gross section of plate	27,810
Tensile stress on net section of plate	54,650
Compressive stress on bearing surface of rivets	56,610
Shearing stress on rivets	23,190

No. 779.—¾″ Steel Plate. Joint D..



1⅛″ steel rivets, hand-driven.
Punched holes: Punch, 1 3/16″; die, 1 5/16″.

	Square inches.
Gross sectional area of plate	7.37
Net sectional area of plate	3.74
Bearing surface of rivets	3.63
Shearing area of rivets	8.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	0.	.....	
20,000	.0007	.....	
50,000	.0020	.....	
70,000	.0031	.....	
5,000	.....	.0008	
70,000	.0031	.....	
80,000	.0039	.....	
90,000	.0049	.....	
100,000	.0061	.....	
110,000	.0080	.....	
120,000	.0095	.....	
130,000	.0110	.....	
140,000	.0128	.....	
150,000	.0143	.....	
160,000	.0163	.....	
170,000	.02	.....	
180,000	.03	.....	
190,000	.03½	.....	
200,000	.06	.....	
202,700	.....	.....	Ultimate strength.

Fractured plate *B* across line of rivet holes.
Granular appearance radiating from rivet holes.

Maximum loads on joint.

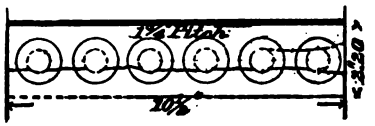
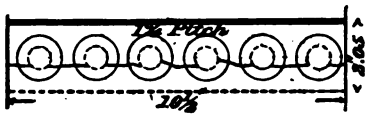
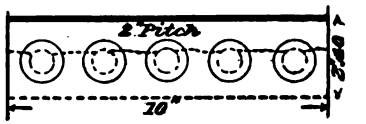
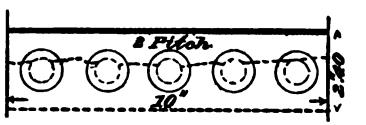
	Pounds per sq. inch.
Tensile stress on gross section of plate	27,500
Tensile stress on net section of plate	54,200
Compressive stress on bearing surface of rivets	55,840
Shearing stress on rivets	22,880

2 b.

TABULATION OF SINGLE-RIVETED LAP-JOINTS.

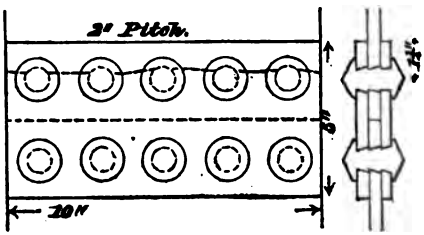
IRON PLATE.

[The figures in heavy faced type indicate the manner of failure. When different kind of fracture

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.
4418	D D.		⅜" iron plate.
4419	D D..		⅜" iron plate.
4428	A A A A.		⅜" iron plate.
4429	A A A A..		⅜" iron plate.

TABULATION OF SINGLE-RIVETED BUTT-JOINTS.

IRON PLATE.

764	L.		⅜" iron plate.
765	L L..		⅜" iron plate.

2 b.

TABULATION OF SINGLE-RIVITED LAP-JOINTS.

IRON PLATE.

occurred in the same joint, it is indicated by employing heavier type in more than one column.]

Size and kind of rivets and holes.	Sectional area of plate.		Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of plate, pounds per square inch.	Maximum loads on joint, pounds per square inch.				Efficiency of joint.
	Gross.	Net.				Tension on gross section of plate.	Tension on net section of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	
	Sq in.	*Sq.in.*	*Sq.in.*	*Sq.in.*						*Pr. ct.*
1¼″ iron rivets ..... } ¾″ punched holes .. }	4.06	2.29	1.77	2.67	47,180	22,170	**39,300**	50,850	33,710	47.0
1¼″ iron rivets..... } ¾″ punched holes... }	4.06	2.29	1.77	2.67	47,180	23,180	**41,000**	53,050	35,170	49.0
¾″ iron rivets..... } 1⅛″ punched holes.. }	4.75	2.71	2.04	2.59	44,615	20,340	**35,650**	47,350	37,300	45.6
¾″ iron rivets ..... } 1⅛″ punched holes.. }	4.75	2.71	2.04	2.59	44,615	20,050	**35,150**	46,690	36,780	44.9

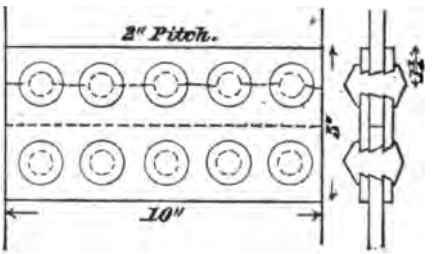
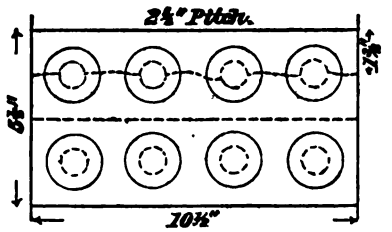
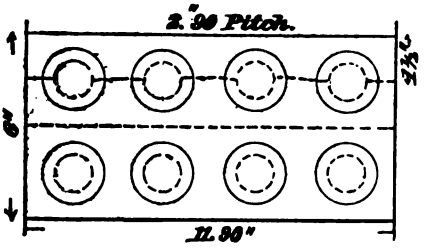
TABULATION OF SINGLE-RIVETED BUTT-JOINTS.

IRON PLATE.

1¼″ iron rivets ..... } ¾″ punched holes .. }	3.97	2.42	1.55	4.42	47,180	28,260	**46,360**	72,390	25,380	59.9
1¼″ iron rivets ..... } ¾″ punched holes .. }	3.94	2.40	1.54	4.42	47,180	28,550	**46,875**	73,050	25,450	60.5

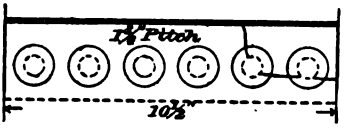
TABULATION OF SINGLE-RIVETED BUTT-JOINTS—Continued.

IRON PLATE—Continued.

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.
768	D.		⅜" iron plate
769	D..		⅜" iron plate
772	D.		⅝" iron plate
773	D..		⅝" iron plate
776	D.		¾" iron plate
777	D..		¾" iron plate

TABULATION OF SINGLE-RIVETED LAP-JOINTS.

STEEL PLATE.

4420	M.		⅜" steel plate

TABULATION OF SINGLE-RIVETED BUTT-JOINTS—Continued.

IRON PLATE—Continued.

Size and kind of rivets and holes.	Sectional area of plate.		Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of plate, pounds per square inch.	Maximum loads on joint, pounds per square inch.				Efficiency of joint.
	Gross.	Net.				Tension on gross section of plate.	Tension on net section of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	
	Sq.in.	*Sq.in.*	*Sq.in.*	*Sq.in.*						*Pr. ct.*
¾″ iron rivets ..... } 1⅛″ punched holes . }	4.81	2.75	2.06	5.18	44,615	26,530	**46,400**	61,940	24,630	59.4
¾″ iron rivets ..... } 1⅛″ punched holes . }	4.77	2.73	2.04	5.18	44,615	26,400	**46,140**	61,740	24,310	59.2
1″ iron rivets ..... } 1⅛″ punched holes. }	6.38	3.68	2.70	7.08	44,635	25,530	**44,260**	60,330	23,010	57.2
1″ iron rivets ..... } 1⅛″ punched holes. }	6.45	3.73	2.72	7.08	44,635	24,490	**42,350**	58,080	22,310	54.9
1⅛″ iron rivets..... } 1⅛″ punched holes. }	7.98	4.58	3.40	8.86	46,590	24,290	**42,310**	57,000	21,870	52.1
1⅛″ iron rivets..... } 1⅛″ punched holes. }	8.15	4.68	3.47	8.86	46,590	24,073	**41,920**	56,540	22,140	51.7

TABULATION OF SINGLE-RIVETED LAP-JOINTS.

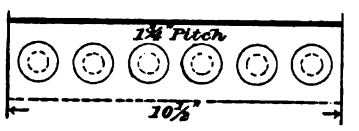
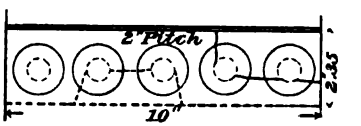
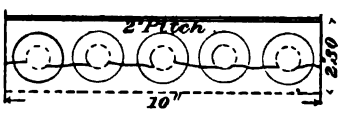
STEEL PLATE.

¾″ iron rivets ..... } 1⅛″ punched holes . }	3.96	2.05	1.91	3.11	53,330	31,720	**61,270**	65,760	**40,390**	59.5

TABULATION OF SINGLE-RIVETED LAP-JOINTS—Continued.

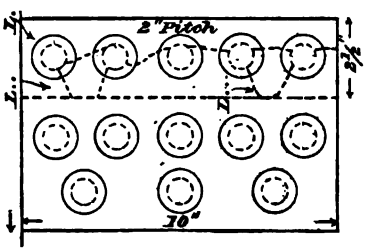
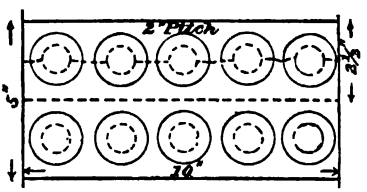
STEEL PLATE—Continued.

[NOTE.—The figures in larger type indicate the manner of failure. When different kind of fract-

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.
4427	M..		⅜" steel plate
4430	AAA.		¼" steel plate
4431	AAA..		⅜" steel plate

TABULATION OF SINGLE-RIVETED BUTT-JOINTS.

STEEL PLATE—Continued.

766	L.		⅜" steel plate
767	L..		⅜" steel plate
770	D.		¼" steel plate
771	D..		¼" steel plate

TABULATION OF SINGLE-RIVETED LAP-JOINTS—Continued.

STEEL PLATE—Continued.

ure occurred in the same joint it is indicated by employing larger type in more than one column.]

Size and kind of rivets and holes.	Sectional area of plate.		Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of plate, pounds per square inch.	Maximum loads on joint, pounds per square inch.				Efficiency of joint.
	Gross.	Net.				Tension on gross section of plate.	Tension on net section of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	
	Sq.in.	*Sq.in.*	*Sq.in.*	*Sq.in.*						*Pr.ct.*
⅞″ iron rivets ..... } 1⅛″ punched holes . }	3.94	2.04	1.90	3.11	53,330	31,500	60,830	65,320	**39,900**	59.1
1⅛″ iron rivets ..... } 1″ punched holes .. }	5.02	2.43	2.59	3.93	57,215	23,000	**47,530**	44,590	**29,390**	40.2
1⅛″ iron rivets ..... } 1″ punched holes .. }	5.05	2.45	2.60	3.93	57,215	24,180	**49,840**	46,960	31,070	42.3

TABULATION OF SINGLE-RIVETED BUTT-JOINTS.

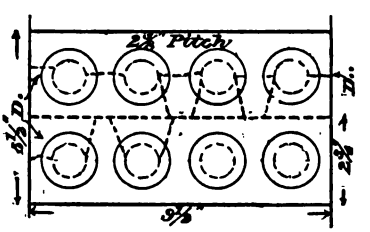
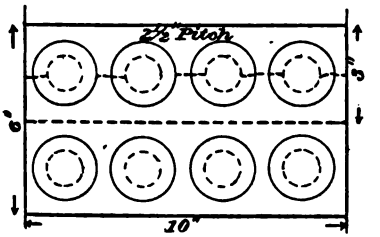
STEEL PLATE—Continued.

1⅛″ iron rivets ..... } ¾″ punched holes .. }	3.61	2.20	1.41	4.42	53,330	38,240	**62,770**	**97,940**	31,240	71.7
1⅛″ iron rivets ..... } 1″ punched holes .. }	3.68	2.24	1.44	4.42	53,330	37,260	**61,210**	**95,210**	31,020	69.8
1⅛″ steel rivets..... } ¾″ punched holes .. }	4.89	2.32	2.57	7.85	57,215	32,690	**68,920**	62,220	20,370	57.1
1⅛″ steel rivets..... } 1″ punched holes .. }	4.96	2.34	2.62	7.85	57,215	31,470	**66,710**	59,580	19,890	55.0

TABULATION OF SINGLE-RIVETED BUTT-JOINTS—Continued.

STEEL PLATE—Continued.

[NOTE.—The figures in larger type indicate the manner of failure. When different kind of fract

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.
774	D.		⅜" steel plate .....
775	D..		⅜" steel plate .....
778	D.		⅜" steel ylate .....
779	D..		⅜" steel plate .....

TABULATION OF SINGLE-RIVETED BUTT-JOINTS—Continued.

STEEL PLATE—Continued.

ure occurred in the same joint it is indicated by employing larger type in more than one column.]

Size and kind of rivets and holes.	Sectional area of plate.		Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of plate, pounds per square inch.	Maximum loads on joint, pounds per square inch.				Efficiency of joint.
	Gross.	Net.				Tension on gross section of plate.	Tension on net section of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	
	Sq.in.	*Sq.in.*	*Sq.in.*	*Sq.in.*						*Pr.ct.*
1″ steel rivets..... } 1 1/16 punched holes . }	5.91	3.16	2.75	7.08	52,445	33,250	**62,180**	**71,450**	27,750	63.4
1″ steel rivets..... } 1 1/16″ punched holes . }	5.91	3.16	2.75	7.08	52,445	33,470	**62,590**	**71,930**	27,940	63.8
1 1/8″ steel rivets..... } 1 3/16″ punched holes }	7.39	3.76	3.63	8.86	51,545	27,810	**54,650**	55,610	23,190	54.0
1 1/8″ steel rivets..... } 1 3/16″ punched holes }	7.37	3.74	3.63	8.86	51,545	27,500	**54,260**	55,840	22,810	53.4

3 a.

COMPRESSION OF 3″ × 3″ WROUGHT-IRON

This series embraces the tests of duplicate bars of 3″ × 3″ iron, in lengths from 10 to 60 diameters, having pin ends of $1\frac{1}{2}$″ diameter.

Bars with one pin end and flat end, bars with two flat ends 30 and 40 diameters long, also bars pin ended 40 diameters long, in which the diameters of the pins were varied from $\frac{7}{8}$″ to $2\frac{1}{4}$″.

The iron was branded "Catasaqua," and was supposed to be of uniform quality throughout.

Tensile tests are recorded in the Report of Tests, 1882, pages 206–208.

The following is a synopsis of these results:

No. of test.	Dimensions.		Sectional area.	Elastic limit.	Ultimate tensile strength.	Elongation in 20 inches.	Elongation in 50 es.
	Width.	Thickness.					
	Inches.	*Inches.*	*Sq. inches.*	*Lbs. per sq. in.*	*Lbs. per sq. in.*	*Per cent.*	*Per cent.*
321	3.00	2.00	6.00	24,330	51,000	21.5	.....
322	3.03	2.96	8.97	25,640	50,446	21.5	.....
323	3.00	3.00	9.00	21,780	49,555	.....	22.7

Contraction of area.	Modulus of elasticity.	Appearance of fracture.	
		Fibrous.	Granular.
Per cent.		*Per cent.*	*Per cent.*
31.3	28,170,000	60	40
28.6	25,970,000	40	60
33.3	29,760,000	45	55

Before testing the compression bars were straightened in a screw press. Those with pin ends were placed in the testing-machine with the pins vertical. Bars of 18 diameters and longer were counter-weighted at the middle by a weight of half the weight of the bar.

The compressions and sets were determined within the gauged length, by measurements taken with a screw micrometer graduated to thousandths of an inch, and by estimation readings taken to a tenth of a graduation, or $\frac{1}{10000}$″.

The measuring instrument rested on the upper surface of the bar and in the plane of the pins.

Deflections were measured at the middle of the specimens. For this purpose an arm carrying a pointer was clamped to the bar, and the movement of the bar indicated by the pointer moving across the face of dial. Movements upwards and horizontally from the experimenter, are given plus signs, while downward deflections, and toward the experimenter in a horizontal direction, are given minus signs.

The pressure was gradually increased till the highest load was reached the bar was capable of sustaining, which was recorded as the ultimate strength.

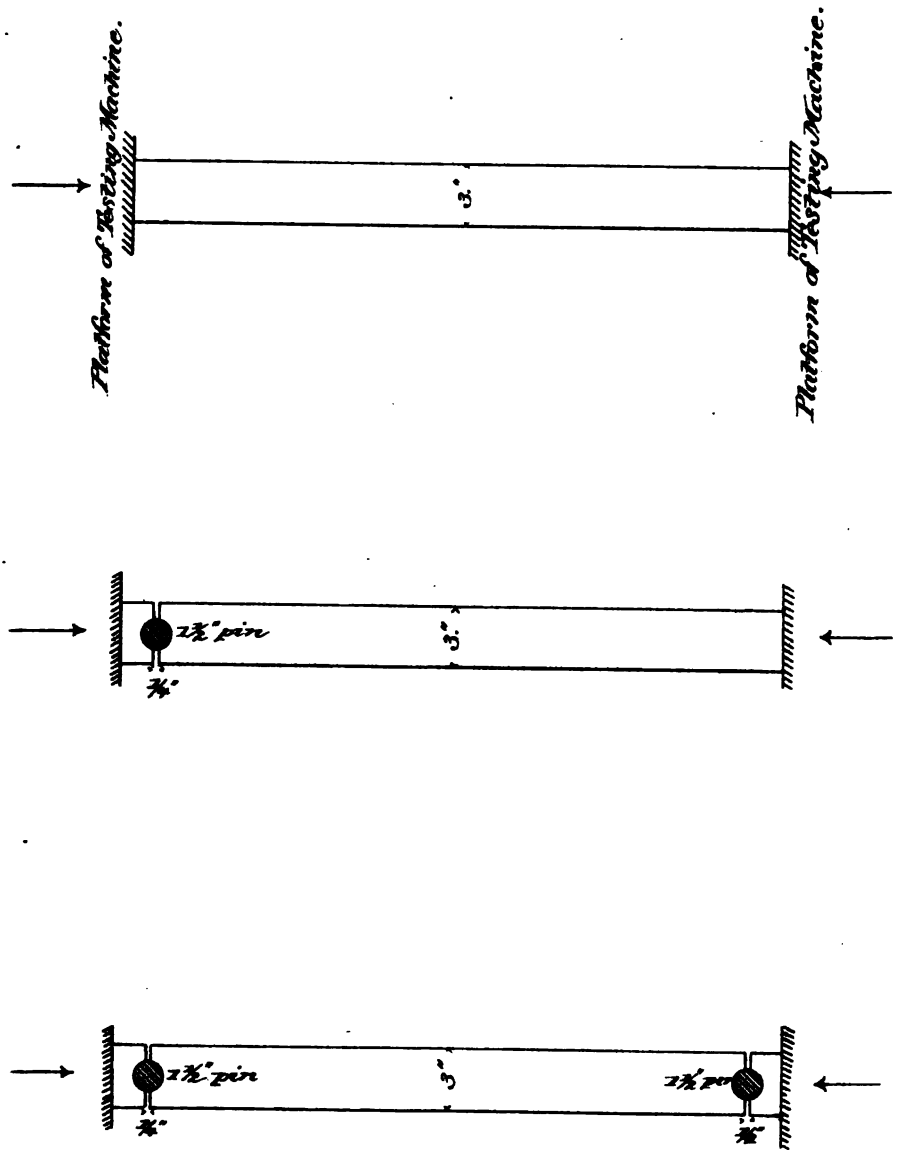
The behavior of the bars was noted after the maximum loads had been passed, and the pressures were falling off.

In a number of cases, after the deflections had reached a considerable amount, ordinates were measured showing the curves of flexure the bars had assumed under pressure.

Bars of the same length, and having the same kinds of pin ends, displayed variations in ultimate resistance, which were attributed to initial strains in the material tested, which annealing would assist to correct.

Compression of 3' x 3' Wrought Iron bars.

Sketches of end bearings.



S. EX. 5, 1, 48.

These results, and those obtained with built columns, suggest the need of such an examination of the material while under compression stress as shall reveal the true causes of failure in order to determine the relative influence of process of manufacture, workmanship, and form of cross-section on the ultimate strength of the material.

The increased resistance obtained by the use of larger pins is indicated in the experiments with pins from $\frac{7}{8}$″ to $2\frac{1}{4}$″ diameter.

The behavior of long specimens, after the maximum load was passed, is deserving of notice. When the lateral deflection had reached a certain amount (varying with the length of specimens) sudden springing would occur; the resistance of the post at the time dropping in some cases fifty per cent.

The low transverse strength which these long posts have, and the serious injury which results from their deflection, make it appear that, practically considered, long posts, such as are found to fail suddenly, are not so safe as their maximum resistance alone would indicate; making it prudent in certain cases to employ a larger factor of safety as the length of column increases.

Chemical analysis.

[Made by Capt. John Pitman, U. S. A.]

Silicon	0.084
Phosphorus	0.220 or 0.221
Sulphur	0.048
Manganese	.218
Copper	.054
Cobalt	.027
Nickel	.039
Combined carbon	0.014 or 0.009
Graphite	0.039
Total carbon	0.053 or 0.048
Arsenic	0.037
Slag, &c	1.68
Silica	0.11

No. 4378.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}$″ pins, 30″.
Length over all, 29″.72.
Weight, 72 pounds.
Not counter-weighted.
Sectional area (2″.96 horizontal × 2″.97 vertical), 8.79 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000			0.	0.	
10,000			0.	0.	
20,000			0.	—.00½	
30,000			0.		
40,000			0.		
50,000			0.		
60,000			0.		
70,000			0.		
80,000			0.		
90,000			0.		
100,000			0.		
110,000			0.		
120,000			0.		Scale starts off in front of pins.
130,000			0.		
140,000			0.		

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
150,000	.....	.....	0.	.....	
160,000	.....	.....	0.	.....	
170,000	.....	.....	0.	.....	
180,000	.....	.....	0.	.....	
190,000	.....	.....	0.	0.	
200,000	.....	.....	0.	0.	
210,000	.....	.....	0.	0.	
220,000	.....	.....	0.	0.	
230,000	.....	.....	.00½	—.01	
235,000	.....	.....	.08	—.04	
240,000	.....	.....	.16	—.05	
245,000	.....	.....	.25	—.05	
248,400	.....	.....	.38	—.05	Ultimate strength = 28,260 pounds per square inch.
235,000	.....	.....	.70	—.05	Load and deflections taken as pressure fell.

No. 4379.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 30″.
Length over all, 29″.72.
Weight, 72 pounds.
Not counter-weighted.
Sectional area (2″.99 horizontal × 2″.98 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	.....	.....	0.	0.	
10,000	.....	.....	0.	0.	
20,000	.....	.....	0.	0.	
30,000	.....	.....	0.	0.	
40,000	.....	.....	0.	0.	
50,000	.....	.....	0.	0.	
60,000	.....	.....	0.	0.	
70,000	.....	.....	0.	0.	
80,000	.....	.....	0.	0.	
90,000	.....	.....	0.	0.	
100,000	.....	.....	0.	0.	
110,000	.....	.....	0.	0.	
120,000	.....	.....	0.	0.	
130,000	.....	.....	0.	0.	
140,000	.....	.....	0.	0.	
150,000	.....	.....	0.	0.	Scale starts off in front of pins.
160,000	.....	.....	0.	0.	
170,000	.....	.....	0.	0.	
180,000	.....	.....	0.	0.	
190,000	.....	.....	0.	0.	
200,000	.....	.....	0.	0.	
210,000	.....	.....	0.	.00½	
220,000	.....	.....	0.	.....	
230,000	.....	.....	0.	.....	
240,000	.....	.....	0.	.....	
245,000	.....	.....	0.	.01	
250,000	.....	.....	0.	.....	
255,000	.....	.....	0.	.....	
260,000	.....	.....	0.	.....	
265,000	.....	.....	0.	.01½	
270,000	.....	.....	0.	.....	
275,000	.....	.....	0.	.02	
278,000	.....	.....	0. —.31	.03 .04	
285,000	.....	.....	—.34	.04	Ultimate strength = 31,990 pounds per square inch.

Failed by horizontal deflection perpendicular to the axis of the pins. After passing the maximum load the pressure fell off to 279,000 pounds, which it recovered from and increased to 284,000 pounds. This behavior was repeated when the horizontal deflection had reached —".55; the load fell off gradually, the deflection increasing at a more rapid rate; the specimen showing no further indications of recovering strength.

No. 4376.

(Tested with two pin ends.)

Length, center to center, of 1½" pins, 42"; over all, 41".71.
Gauged length, 25".
Weight, 101½ pounds.
Not counter-weighted.
Sectional area (2".98 horizontal × 2".99 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0025	.....	0.	—.01	
20,000	.0041	.....	0.	—.01	
30,000	.0053	.....	0.	—.01	
40,000	.0064	.....	0.	—.01	
50,000	.0076	.....	0.	—.01	
1,000	.....	0.	0.	0.	
60,000	.0085	.....	0.	—.01	
70,000	.0095	.....	0.	—.01½	
80,000	.0105	.....	0.	—.01½	
90,000	.0114	.....	0.	—.01½	
100,000	.0123	.....	0.	—.01½	
1,000	.....	0.	0.	0.	
110,000	.0130	.....	0.	—.01½	
120,000	.0139	.....	0.	—.01½	
130,000	.0145	.....	0.	—.02	
140,000	.0154	.....	0.	—.02	Scale starts off in front of pins.
150,000	.0160	.....	0.	—.02	
1,000	.....	—.0002	0.	0.	
160,000	.0167	.....	0.	—.02	
170,000	.0175	.....	—.01	—.01½	
180,000	.0180	.....	.....	—.01½	
190,000	.0188	.....	.....	—.01½	
200,000	.0200	.....	.....	—.01½	
1,000	.....	0.	0.	0.	
210,000	.0215	.....	—.01	—.01½	
220,000	.0227	.....	.....	—.01½	
230,000	.0263	.....	—.02	—.01½	
232,100	.....	.....	.....	.....	Ultimate strength=26,050 pounds per square inch.
200,000	.....	.....	—.66	—.07	Loads and deflections taken as pressure fell.
170,000	.....	.....	—1.10	—.10	

Deflected gradually without sudden springing.

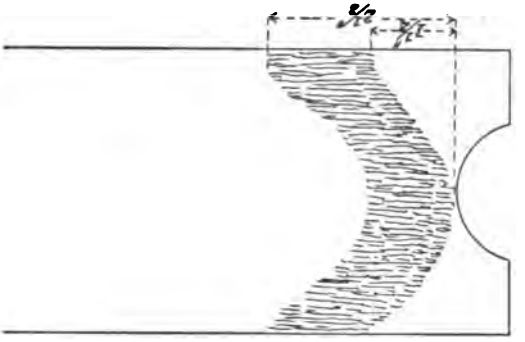
No. 4377.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 42″.
Length over all, 41″.72.
Gauged length, 25″.
Weight, 101 pounds.
Not counter-weighted.
Sectional area (2″.98 horizontal × 2″.97 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0015	.....	0.	0.	
20,000	.0029	.....	0.	—.00½	
30,000	.0040	.....	0.	—.01	
40,000	.0050	.....	0.	—.01	
50,000	.0060	.....	0.	—.01	
1,000	.....	0.	0.	0.	
60,000	.0071	.....	0.	—.01½	
70,000	.0081	.....	0.	—.01½	
80,000	.0090	.....	0.	—.01½	
90,000	.0101	.....	0.	—.01½	
100,000	.0111	.....	0.	—.01½	
1,000	.....	0.	0.	0.	
110,000	.0120	.....	0.	—.01½	
120,000	.0131	.....	0.	—.01½	
130,000	.0140	.....	0.	—.01½	
140,000	.0149	.....	0.	—.01½	
150,000	.0159	.....	0.	—.01½	
1,000	.....	0.	0.	—.00½	
160,000	.0167	.....	0.	—.01½	Scale starts off in front of pins.
170,000	.0175	.....	0.	—.01½	
180,000	.0183	.....	0.	—.01½	
190,000	.0190	.....	0.	—.01½	
200,000	.0200	.....	0.	—.01½	
1,000	.....	0.	0.	—.00½	
210,000	.0210	.....	0.	—.01½	
220,000	.0220	.....	0.	—.01½	
230,000	.0231	.....	0.	—.01½	
235,000	.0240	.....	0.	—.01½	
240,000	.0250	.....	0.	—.02	
245,000	.0260	.....	0.	—.02	
250,000	.0275	.....	0.	—.02	
1,000	.....	.0027	0.	—.01	
255,000	.0289	.....	0.	—.02	
260,000	.0808	.....	0.	—.02	
265,000	.0335	.....	0.	—.03	
267,900	.....	.....	.02	—.03	Ultimate strength = 30,270 pounds per square inch.
			.20	—.20	Sustained maximum load till these deflections were reached.
260,000	.....	.....	.39	—.21	Loads and deflections taken as pressure fell.
240,000	.....	.....	.65	—.20	

Deflected gradually without sudden springing.



Shaded portion of sketch shows the part of the bar having scale disturbed by compression on bearing surface of $1\frac{1}{2}''$ pins.

No. 4374.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 53″.99.
Length over all, 53″.72.
Gauged length, 25″.
Weight, $131\frac{1}{2}$ pounds.
Counter-weight at middle, 65 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical) 8.91 square inches

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0008	.....	0.	0.	
20,000	.0025	.....	0.	—.00½	
30,000	.0035	.....	0.	—.00½	
40,000	.0045	.....	0.	.01	
50,000	.0055	.....	0.	—.01	
1,000	.....	0.	0.	0.	
60,000	.0067	.....	0.	—.01	
70,000	.0075	.....	0.	—.01	
80,000	.0085	.....	0.	—.01	
90,000	.0094	.....	0.	—.01	
100,000	.0103	.....	0.	—.01	
1,000	.....	0.	0.	0.	
110,000	.0111	.....	0.	—.01	
120,000	.0120	.....	0.	—.01	
130,000	.0129	.....	0.	—.01	
140,000	.0137	.....	0.	—.01	
150,000	.0145	.....	0.	—.01	Scale starts off in front of pins.
1,000	.....	—.0002	0.	0.	
160,000	.0152	0.	0.	—.00½	
170,000	.0159	.....	0.	—.00½	
180,000	.0165	.....	0.	—.00½	
190,000	.0170	.....	0.	0.	
200,000	.0176	.....	0.	0.	
1,000	.....	—.0005	0.	0.	
210,000	.0183	.....	0.	+.00½	
220,000	.0190	.....	0.	.01	
230,000	.0198	.....	—.02	.02	
234,550	.....	.....	—.06	.04	Ultimate strength = 26,320 pounds per square inch.
200,000	.....	.....	—.60	.07	Loads and deflections taken as pressure fell.
160,000	.....	.....	—.97	.10	

Deflected gradually without sudden springing.

No. 4375.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 54″.
Length over all, 53″.70.
Gauged length, 25″.
Weight, 131 pounds.
Counter-weight at middle, 65 pounds.
Sectional area (2″.97 horizontal × 2″.99 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	.....	0.	0.	0.	
10,000	.0005	.....	0.	0.	
20,000	.0016	.....	0.	0.	
30,000	.0026	.....	0.	0.	
40,000	.0037	.....	0.	0.	
50,000	.0047	.....	0.	0.	
1,000	.....	.0007	0.	0.	
60,000	.0057	.....	0.	0.	
70,000	.0068	.....	0.	0.	
80,000	.0078	.....	0.	0.	
90,000	.0086	.....	0.	0.	
100,000	.0095	.....	0.	0.	
1,000	.....	.0005	0.	0.	
110,000	.0105	.....	0.	0.	
120,000	.0115	.....	0.	0.	
130,000	.0124	.....	0.	0.	
140,000	.0131	.....	0.	0.	
150,000	.0141	.....	0.	0.	Scale starts off in front of pins.
1,000	.....	.0004	0.	0.	
160,000	.0150	.....	0.	.00½	
170,000	.0160	.....	0.	.00½	
180,000	.0168	.....	0.	—.00½	
190,000	.0177	.....	0.	0.	
200,000	.0188	.....	0.	0.	
1,000	.....	.0005	0.	0.	
210,000	.0200	.....	0.	0.	
220,000	.0215	.....	0.	0.	
230,000	.0239	.....	0.	0.	
235,000	.0257	.....	0.	0.	
237,000	.....	.....	+.02	—.00½	Ultimate strength = 26,710 pounds per square inch.
200,000	.....	.....	.58	—.03	Load and deflections taken as pressure fell.
170,000	.....	.....	.85	—.04	

Deflected gradually without sudden springing.

No. 4372.
(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 59″.98.
Length over all, 59″.70.
Gauged length, 50″.
Weight, 146 pounds.
Counter-weight at middle, 73 pounds.
Sectional area (2″.96 horizontal × 3″ vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0050	.....	0.	−.01	
20,000	.0085	.....	0.	−.01⅛	
30,000	.0110	.....	0.	−.01⅛	
40,000	.0134	.....	0.	−.01⅛	
50,000	.0155	.....	0.	−.01⅛	
1,000	.....	0.	0.	0.	
60,000	.0171	.....	0.	−.01⅛	
70,000	.0190	.....	0.	−.01⅛	
80,000	.0210	.....	0.	−.01⅛	
90,000	.0230	.....	0.	−.01⅛	
100,000	.0249	.....	0.	−.01⅛	
1,000	.....	0.	0.	0.	
110,000	.0268	.....	0.	−.01⅛	
120,000	.0286	.....	0.	−.01⅛	
130,000	.0308	.....	0.	−.01⅛	
140,000	.0325	.....	0.	−.01⅛	Scale starts off bar in front of pins.
150,000	.0344	.....	0.	−.01⅛	
1,000	.....	0.	0.	+.00½	
160,000	.0361	.....	0.	−.01	
170,000	.0381	.....	0.	−.01	
180,000	.0399	.....	0.	−.01	
190,000	.0420	.....	0.	−.00½	
200,000	.0440	.....	0.	0.	
1,000	.....	.0010	0.	+.01	
210,000	.0465	.....	.00½	0.	
220,000	.0490	.....	.....	0.	
230,000	.0528	.....	.03	−.00½	
233,650	.....	.....	.09	−.03	Ultimate strength = 26,310 pounds per square inch.
170,000	.....	.....	.90	−.01	Load and deflections when test was discontinued.

Deflected gradually without sudden springing.

No. 4373.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 59″.98.
Length over all, 59″.68.
Gauged length, 50″.
Weight, $145\frac{1}{2}$ pounds.
Counter-weight at middle, 73 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0031	.....	0.	—.00½	
20,000	.0057	.....	0.	—.00½	
30,000	.0080	.....	0.	—.01	
40,000	.0101	.....	0.	—.01	
50,000	.0124	.....	0.	—.01½	
1,000	.....	—.0003	0.	0.	
60,000	.0143	.....	0.	—.01½	
70,000	.0162	.....	0.	—.01½	
80,000	.0182	.....	0.	—.01½	
90,000	.0197	.....	0.	—.01½	
100,000	.0216	.....	0.	—.02	
1,000	.....	—.0005	0.	0.	
110,000	.0235	.....	0.	—.02	
120,000	.0252	.....	0.	—.02	
130,000	.0269	.....	0.	—.02	
140,000	.0285	.....	0.	—.02	
150,000	.0304	.....	0.	—.02	
1,000	.....	—.0007	0.	0.	
160,000	.0320	.....	0.	—.01½	
170,000	.0334	.....	0.	—.01	Scale starts off in front of pins.
180,000	.0350	.....	0.	—.00½	
190,000	.0365	.....	0.	—.00½	
200,000	.0380	.....	0.	0.	
1,000	.....	—.0004	0.	0.	
210,000	.0396	.....	0.	0.	
220,000	.0416	.....	0.	0.	
230,000	.0440	.....	0.	+.00½	
237,400	.....	.....	.04	.03	Ultimate strength = 26,640 pounds per square inch.
200,000	.....	.....	.60	.16	Loads and deflections taken as pressure fell.
170,000	.....	.....	.89	.18	

Deflected gradually without sudden springing.

No. 4370.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 66″.
Length over all, 65″.74.
Gauged length, 50″.
Weight, 161 pounds.
Counter-weight at middle, 80 pounds.
Sectional area (2″.98 horizontal × 2″.98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0028	.....	0.	—.01	
20,000	.0077	.....	0.	—.02	
30,000	.0110	.....	0.	—.03	
40,000	.0147	.....	0.	—.03½	
50,000	.0161	.....	0.	—.04	
1,000	.....	.0002	0.	0.	
60,000	.0179	.....	0.	—.04	
70,000	.0200	.....	0.	—.04	
80,000	.0219	.....	0.	—.04	
90,000	.0237	.....	0.	—.04	
100,000	.0256	.....	0.	—.04	
1,000	.....	.0003	0.	0.	
110,000	.0271	.....	0.	—.03½	
120,000	.0288	.....	0.	—.03½	Scale starts off bar in front of pins.
130,000	.0306	.....	0.	—.03½	
140,000	.0321	.....	0.	—.03½	
150,000	.0338	.....	0.	—.03½	
1,000	.....	.0004	0.	—.00½	
160,000	.0349	.....	0.	—.03	
170,000	.0365	.....	0.	—.03	
180,000	.0373	.....	0.	—.02½	
190,000	.0387	.....	0.	—.02	
200,000	.0401	.....	0.	—.02	
1,000	.....	.0006	0.	—.01	
210,000	.0419	.....	0.	—.02	
220,000	.0446	.....	.02	—.02	
226,900	.....	.....	.12	—.04	Ultimate strength = 25,550 pounds per square inch.
165,000	.....	.....	.65	—.07	
150,000	.....	.....	.96	—.09	

Increased the deflections after passing the maximum load without sudden springing.

No. 4371.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 66″.
Length over all, 65″.73.
Gauged length, 50″.
Weight, 160½ pounds.
Counter-weight at middle, 80 pounds.
Sectional area (2″.97 horizontal × 2″.98 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0040	.....	0.	−.01	
20,000	.0080	.....	0.	−.01½	
30,000	.0113	.....	0.	−.02	
40,000	.0140	.....	0.	−.02	
50,000	.0160	.....	0.	−.02½	
1,000	.....	0.	0.	0.	
60,000	.0180	.....	0.	−.03	
70,000	.0199	.....	0.	−.03	
80,000	.0217	.....	0.	−.03	
90,000	.0233	.....	0.	−.03	
100,000	.0251	.....	0.	−.03	
1,000	.....	−.0005	0.	0.	
110,000	.0267	.....	0.	−.03	
120,000	.0284	.....	0.	−.03	
130,000	.0300	.....	0.	−.03	
140,000	.0311	.....	0.	−.03	
150,000	.0325	.....	0.	−.02	
1,000	.....	−.0009	0.	0.	
160,000	.0335	.....	−.01	−.02	
170,000	.0345	.....	−.01	−.01	Scale starts off bar in front of pins.
180,000	.0352	.....	−.02	−.00½	
190,000	.0355	.....	−.02	0.	
200,000	.0364	.....	−.03	0.	
1,000	.....	−.0010	0.	0.	
210,000	.0376	.....	−.04	+.00½	
220,000	.0389	.....	−.06	.01	
224,000	.....	.....	−.12	.01	Ultimate strength=25,310 pounds per square inch.
165,000	.....	.....	−.85	0.	

Failed by horizontal deflection perpendicular to the axis of the pins. Increased the deflection to .″85 without sudden springing.

No. 4368.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 71″.98.
Length over all, 71″.73.
Gauged length, 50″.
Weight, 175 pounds.
Counter-weight at middle, 87 pounds.
Sectional area (2″.97 horizontal × 2″.97 vertical), 8.82 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0027	.....	0.	—.00½	
20,000	.0061	.....	0.	—.01	
30,000	.0086	.....	0.	—.02	
40,000	.0112	.....	0.	—.03	
50,000	.0135	.....	0.	—.03	
1,000	.....	.....	0.	0.	
60,000	.0155	.....	0.	—.03	
70,000	.0179	.....	0.	—.02½	
80,000	.0194	.....	0.	—.02½	
90,000	.0215	.....	0.	—.02½	
100,000	.0234	.....	0.	—.02½	
1,000	.....	0.	0.	0.	
110,000	.0252	.....	0.	—.03	
120,000	.0273	.....	0.	—.03	
130,000	.0291	.....	0.	—.03	
140,000	.0309	.....	0.	—.03	
150,000	.0328	.....	0.	—.03	
1,000	.....	0.	0.	0.	
160,000	.0341	.....	0.	—.03	
170,000	.0360	.....	0.	—.03	
180,000	.0377	.....	.....	—.03	Scale started off bar in front of pins.
190,000	.0392	.....	0.	—.02	
200,000	.0407	.....	0.	—.02	
1,000	.....	.0006	0.	—.00½	
220,000	.0447	.....	0.	—.02	
230,000	.0468	.....	0.	—.02	
240,000	.0525	.....	—.02	—.03	
246,300	.....	.....	—.08	—.08	Ultimate strength =27,930 pounds per square inch.
Deflected without sudden springing.					
160,000	.....	.....	—1.00	—.20	Load and deflections when test was discontinued.

No. 4369.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 71″.98.
Length over all, 71″.78.
Gauged length, 50″.
Weight, 175½ pounds.
Counter-weight at middle, 87 pounds.
Sectional area (2″.97 horizontal × 2″.98 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0017	.....	0.	0.	
20,000	.0039	.....	0.	0.	
30,000	.0056	.....	0.	0.	
40,000	.0076	.....	0.	0.	
50,000	.0095	.....	0.	0.	
1,000	.....	.0001	0.	0.	
60,000	.0116	.....	0.	0.	
70,000	.0134	.....	0.	0.	
80,000	.0151	.....	0.	0.	
90,000	.0171	.....	0.	0.	
100,000	.0190	.....	0.	0.	
1,000	.....	.0002	0.	0.	
110,000	.0209	.....	0.	0.	
120,000	.0229	.....	0.	0.	
130,000	.0248	.....	0.	0.	
140,000	.0267	.....	0.	0.	
150,000	.0288	.....	0.	⌐.00½	
1,000	.....	.0002	0.	0.	
160,000	.0324	.....	0.	⌐.01	
170,000	.0339	.....	0.	⌐.01	
180,000	.0360	.....	0.	⌐.01	Scale started off bar in front of pins.
190,000	.0382	.....	0.	⌐.01	
200,000	.0404	.....	0.	⌐.01	
1,000	.....	.0009	0.	0.	
210,000	.0433	.....	0.	⌐.01	
220,000	.0455	.....	0.	⌐.01	
230,000	.0508	.....	.01	⌐.02	
1,000	.....	.0055	.00½	0.	
225,050	.....	.....	.02	⌐.04	Ultimate strength = 26,56 pounds per square inch.
220,000	.....	.....	.14	⌐.40	

Failed by deflecting downward parallel to axis of pins. Took maximum bend 14″ from the middle.

No. 4367.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 78″.03.
Length over all, 77″.78.
Gauged length 50″.
Weight, 190 pounds.
Counter-weight at middle, 95 pounds.
Sectional area (2″.96 horizontal × 3″.01 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0043	.....	0.	—.03	
20,000	.0076	.....	0.	—.03	
30,000	.0100	.....	0.	—.04	
40,000	.0125	.....	0.	—.04	
50,000	.0145	.....	0.	—.04	
1,000	.....	.0004	0.	0.	
60,000	.0161	.....	0.	—.05	
70,000	.0180	.....	0.	—.05	
80,000	.0200	.....	0.	—.05	
90,000	.0220	.....	0.	—.05	
100,000	.0240	.....	0.	—.05	
1,000	.....	.0004	0.	0.	
110,000	.0258	.....	0.	—.05	
120,000	.0277	.....	—.01	—.04	
130,000	.0295	.....	0.01	—.04	
140,000	.0311	.....	0.01	—.04	
150,000	.0334	.....	0.01	—.04	
1,000	.....	.0008	0.	0.	
160,000	.0350	.....	—.01	—.04	
170,000	.0367	.....	—.01	—.04	
180,000	.0384	.....	—.01	—.03	Scale starts off bar in front of pins.
190,000	.0400	.....	—.01	—.03	
200,000	.0418	.....	0.	—.03	
1,000	.....	.0006	0.	—.00½	
210,000	.0436	.....	0.	—.03	
220,000	.0458	.....	.....	—.03	
230,000	.0488	.....	.02	—.02	
238,780	.....	.....	.10	—.03	Ultimate strength = 26,800 pounds per square inch.

When the horizontal deflection reached ″.50 the movement increased rapidly, but without sudden springing, increasing the horizontal deflection to 1″.10; the load then sustained was 140,000 pounds.

No. 4365.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 84″.
Length over all, 83″.77.
Gauged length, 50″.
Weight, 203 pounds.
Counter-weight at middle, 101 pounds.
Sectional area (2″.97 horizontal × 2″.96 vertical), 8.79 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0050	.....	0.	—.03	
20,000	.0084	.....	0.	—.05	
30,000	.0109	.....	0.	—.06	
40,000	.0130	.....	0.	—.06	
50,000	.0152	.....	0.	—.06	
1,000	.....	0.	0.	0.	
60,000	.0168	.....	0.	—.06	
70,000	.0186	0.	0.	—.06	
80,000	.0207	.....	0.	—.06	
90,000	.0226	.....	0.	—.06	
100,000	.0246	.....	0.	—.06	
1,000	.....	—.0003	0.	0.	
110,000	.0264	.....	0.	—.06	
120,000	.0282	.....	0.	—.06	
130,000	.0301	.....	0.	—.06	
140,000	.0320	.....	0.	—.06	
150,000	.0337	.....	0.	—.05	
1,000	.....	—.0005	0.	0.	
160,000	.0354	.....	0.	—.05	
170,000	.0372	.....	0.	—.05	Scale starts off bar in front of pins.
180,000	.0390	.....	0.	—.04	
190,000	.0405	.....	.01	—.04	
200,000	.0422	.....	.01	—.04	
1,000	.....	—.0002	0.	0.	
210,000	.0440	.....	.03	—.02	
220,000	.0460	.....	.08	—.01	
226,560	.....	.....	.17	0.	Ultimate strength = 25,770 pounds per square inch.
200,000	.....	.....	.50	0.	Sudden spring when this deflection was reached, reducing the compressiv strength to 180,000 poundse

No. 4366.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 84″.
Length over all, 83″.75.
Ganged length, 50″.
Weight, 201½ pounds.
Counter-weight at middle, 101 pounds.
Sectional area (2″.97 horizontal × 2″.96 vertical), 8.79 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0062	.....	0.	1/100	
20,000	.0055	.....	0.	1/100	
30,000	.0076	.....	0.	1/100	
40,000	.0096	.....	0.	1/100	
50,000	.0119	.....	0.	1/100	
1,000	.....	0.	0.	0.	
60,000	.0140	.....	0.	1/100	
70,000	.0159	.....	0.	1/100	
80,000	.0177	.....	0.	1/100	
90,000	.0196	.....	0.	1/100	
100,000	.0215	.....	0.	1/100	
1,000	.....	.0001	0.	0.	
110,000	.0235	.....	0.	1/100	
120,000	.0256	.....	0.	1/100	
130,000	.0275	.....	0.	1/100	
140,000	.0295	.....	0.	1/100	
150,000	.0315	.....	0.	1/100	Scale starts off bar in front of pins.
1,000	.....	.0004	0.	0.	
160,000	.0332	.....	.01	1/100	
170,000	.0353	.....	.01	1/100	
180,000	.0375	.....	.02	1/100	
190,000	.0398	.....	.04	1/100½	
200,000	.0425	.....	.09	1/100⅛	
1,000	.....	.0028	.03	.0	
206,450	.....	.....	.20	.0	Ultimate strength = 23,490 pounds per square inch.
138,000	.....	.....	.60	.0	
Sudden deflection which was increased to—					
140,000	.....	.....	1.10	.0	

No. 4364.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 90″.
Length over all, 89″.74.
Gauged length, 80″.
Weight, 220½ pounds.
Counter-weight at middle, 110 pounds.
Sectional area (3″.01 horizontal × 2″.95 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0022	.....	0.	0.	
20,000	.0054	.....	0.	0.	
30,000	.0083	.....	0.	0.	
40,000	.0113	.....	0.	0.	
50,000	.0145	.....	0.	.00½	
1,000	.....	0.	0.	0.	
60,000	.0174	.....	0.	.01	
70,000	.0202	.....	0.	—.01	
80,000	.0235	.....	0.	—.01	
90,000	.0265	.....	0.	—.01	
100,000	.0298	.....	0.	—.01	
1,000	.....	0.	0.	.00½	
110,000	.0330	.....	0.	.01	
120,000	.0364	.....	0.	.01	
130,000	.0397	.....	0.	.01	
140,000	.0430	.....	0.	.00½	
150,000	.0468	.....	0.	.00½	
1,000	.....	0.	0.	.00½	
160,000	.0506	.....	0.	0.	
170,000	.0550	.....	0.	0.	Scale starts off bar in front of pins.
180,000	.0597	.....	—.01	—.01	
190,000	.0644	.....	—.02	—.03	
200,000	.0704	.....	—.04	—.04	
1,000	.....	.0031	0.	0.	
210,000	.....	.....	—.02	—.07	
213,350	.....	.....	—.06	—.16	Ultimate strength = 24,030 pounds per square inch.
130,000	.....	.....	—1.18	—.63	

After passing the maximum load, pressure was continued, the post gradually yielding at first, increasing the deflections more rapidly as they became greater, but without sudden springing.

Test discontinued when the load had full to 130,000 pounds—the deflections at the time as above recorded.

No. 4363.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, $90''$.
Length over all, $89''.74$.
Gauged length, $80''$.
Weight, 220 pounds.
Counter-weight at middle, 110 pounds.
Sectional area ($2''.97$ horizontal $\times$ $2''.98$ vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0090	.....	0.	−.03	
20,000	.0137	.....	0.	−.04	
30,000	.0170	.....	0.	−.04	
40,000	.0206	.....	0.	−.04	
50,000	.0240	.....	0.	−.04	
1,000	.....	0.	0.	0.	
60,000	.0271	.....	0.	−.04	
70,000	.0306	.....	0.	−.04	
80,000	.0338	.....	0.	−.04	
90,000	.0370	.....	0.	−.04	
100,000	.0405	.....	0.	−.04	
1,000	.....	.0002	0.	+.00½	
110,000	.0435	.....	0.	−.04	
120,000	.0466	.....	0.	−.04	
130,000	.0499	.....	0.	−.04	
140,000	.0529	.....	0.	−.04	
150,000	.0560	.....	0.	.04	
1,000	.....	.0602	0.	−.00½	
160,000	.0590	.....	0.	−.04	Scale starts off bar, front of pins.
170,000	.0622	.....	0.	−.04	
180,000	.0657	.....	0.	−.04	
190,000	.0689	.....	0.	−.04	
200,000	.0735	.....	0.	−.05	
1,000	.....	.0019	0.	+.00½	
210,000	.0788	.....	0.	−.06	
220,000	.0886	.....	.01	−.11	
224,000	.....	.....	.....	.....	Ultimate strength = 25,380 pounds per square inch.
Load gradually falling off.					
188,000	.....	.....	.50	−.45	Deflected rapidly.
Load falling off, and deflections increased to					
120,000	.....	.....	1.38	−.84	

No. 1628.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 95″.54.
Length over all, 95″.25.
Gauged length, 80″.
Weight, 230 pounds.
Counter-weight at middle, 115 pounds.
Sectional area (2″.95 horizontal × 2″.95 vertical), 8.70 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0051	.....	0.	—.01	
20,000	.0086	.....	0.	—.01	
30,000	.0120	.....	0.	—.01	
40,000	.0150	.....	0.	—.01	
50,000	.0182	.....	0.	—.01	
1,000	.....	—.0002	0.	0.	
60,000	.0213	.....	.00½	—.01	
70,000	.0242	.....	.00½	—.01	
80,000	.0274	.....	.00½	—.01	
90,000	.0300	.....	.00½	—.01	
100,000	.0336	.....	.00½	—.01	
1,000	.....	—.0004	0.	0.	
110,000	.0369	.....	.00½	—.01	
120,000	.0398	.....	.00½	—.01	
130,000	.0428	.....	.00½	—.01	
140,000	.0457	.....	.00½	—.01	
150,000	.0488	.....	.00½	—.01	
1,000	.....	—.0009	0.	0.	
160,000	.0513	.....	.00½	—.00½	
165,000	.0526	.....	.00½	—.00½	
170,000	.0540	.....	.00½	—.00½	
175,000	.0555	.....	.01	0.	
180,000	.0570	.....	.01	0.	
185,000	.0586	.....	.01	0.	
190,000	.0601	.....	.01	0.	
195,000	.0620	.....	.01	0.	
200,000	.0640	.....	.01	0.	
1,000	.....	.0007	0.	0.	
205,000	.0662	.....	.00½	0.	
210,000	.0684	.....	.00½	0.	
215,000	.0710	.....	.00½	0.	
220,000	.0749	.....	.00½	—.01	
1,000	.....	.0050	0.	—.01	
225,000	.0820	.....	—.05	—.06	Ultimate strength = 25,860 pounds per square inch.
Deflected suddenly at		.....	—.40	.....	
Springing to		.....	—L.70	—.18	

Scale disturbed in front of 1½″ pins.

No. 1629.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 95″.54.
Length over all, 95″.25.
Gauged length, 80″.
Weight, 230 pounds.
Counter-weight at middle, 115 pounds.
Sectional area (2″.97 horizontal × 2″.96 vertical), 8.79 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0059	.....	0.	—.01½	
20,000	.0119	.....	0.	—.03	
30,000	.0180	.....	0.	—.04	
40,000	.0195	.....	0.	—.04	
50,000	.0230	.....	.00½	—.04	
1,000	.....	.0005	0.	0.	
60,000	.0265	.....	.00½	—.04	
70,000	.0294	.....	.00½	—.04	
80,000	.0326	.....	.01	—.04	
90,000	.0360	.....	.01	—.04	
100,000	.0393	.....	.01	—.04	
1,000	.....	0.	0.	0.	
110,000	.0425	.....	.01	—.04	
120,000	.0456	.....	.01	—.04	
130,000	.0490	.....	.01	—.04	
140,000	.0520	.....	.01	—.04	
150,000	.0555	.....	.01	—.04	
1,000	.....	0.	0.	0.	
160,000	.0588	.....	.01	—.04	
170,000	.0623	.....	.01	—.04	
175,000	.0642	.....	.02	—.05	
180,000	.0665	.....	.02	—.05	
185,000	.0685	.....	.02	—.05	
190,000	.0712	.....	.03	—.06	
195,000	.0740	.....	.04	—.07	
200,000	.0785	.....	.04	—.09	
1,000	.....	.0028	.01	0.	
205,000	.....	.....	.03	—.12	
210,000	.....	.....	.05	—.15	
213,100	.....	.....	.10	.20	Ultimate strength = 24,240 pounds per square inch.
.....	.....	.....	.50	.....	Rapid deflection began.
.....	.....	.....	1.52	— .82	Sprung to.

Scale disturbed in front of 1½″ pins.

No. 1626.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 101″.69.
Length over all, 101″.42.
Gauged length, 80″.
Weight, 248½ pounds.
Counter-weight at middle, 124 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0033	.....	0.	0.	
20,000	.0065	.....	0.	0.	
30,000	.0096	.....	0.	0.	
40,000	.0127	.....	0.	0.	
50,000	.0160	.....	0.	0.	
1,000	.....	0.	0.	0.	
60,000	.0190	.....	0.	0.	
70,000	.0218	.....	0.	0.	
80,000	.0250	.....	0.	0.	
90,000	.0283	.....	0.	0.	
100,000	.0314	.....	0.	0.	
1,000	.....	0.	0.	0.	
110,000	.0351	.....	0.	0.	
120,000	.0383	.....	0.	0.	
130,000	.0418	.....	—.00½	0.	
140,000	.0452	.....	—.00½	0.	
150,000	.0488	.....	—.00½	0.	
1,000	.....	0.	0.	0.	
160,000	.0525	.....	—.00½	0.	
165,000	.0542	.....	—.00½	0.	
170,000	.0560	.....	—.00½	0.	
175,000	.0582	.....	—.00½	—.00½	
180,000	.0604	.....	—.00½	—.01	
185,000	.0627	.....	—.00½	—.02	
190,000	.0654	.....	—.02	—.02	
195,000	.0686	.....	—.01	—.04	
200,000	.0714	.....	—.02	—.05	
1,000	.....	.0016	0.	0.	
205,000	.0768	.....	—.02	—.08	
210,000	.....	.....	—.03	—.10	
215,000	.....	.....	—.05	—.16	
220,000	.....	.....	—.09	—.24	Ultimate strength = 24,690 pounds per square inch.
Deflected suddenly at		.....	—.30	—.25	
Springing to		.....	1.78	.46	

Scale disturbed in front of 1½″ pins.

No. 1627.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 101″.67.
Length over all, 101″.44.
Gauged length, 80″.
Weight, 249½ pounds.
Counter-weight at middle, 124 pounds.
Sectional area (3″.02 horizontal × 2″.96 vertical), 8.94 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0031	.....	0.	0.	
20,000	.0066	.....	0.	0.	
30,000	.0100	.....	0.	0.	
40,000	.0130	.....	0.	0.	
50,000	.0160	.....	0.	0.	
1,000	.....	0.	0.	0.	
60,000	.0190	.....	0.	0.	
70,000	.0220	.....	0.	0.	
80,000	.0250	.....	0.	0.	
90,000	.0284	.....	0.	0.	
100,000	.0314	.....	0.	0.	
1,000	.....	0.	0.	0.	
110,000	.0347	.....	0.	0.	
120,000	.0380	.....	0.	0.	
130,000	.0413	.....	—.00½	0.	
140,000	.0445	.....	—.00½	0.	
150,000	.0480	.....	0.01	0.	
1,000	.....	0.	0.	0.	
160,000	.0515	.....	—.01	—.00½	
165,000	.0530	.....	—.01	—.00½	
170,000	.0551	.....	—.02	—.01	
175,000	.0575	.....	—.04	—.01	
180,000	.0597	.....	—.05	—.02	
185,000	.0622	.....	—.07	—.03	
190,000	.0650	.....	—.10	—.04	
1,000	.....	.0019	—.01	—.01	
195,000	.....	.....	—.13	—.06	
197,050	.....	.....	—.21	—.08	Ultimate strength = 22,040 pounds per square inch.

Deflected horizontally, springing to —1″.55 horizontal, —″.08 vertical.
Scale disturbed in front of 1½″ pins.

No. 1624.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 107″.57.
Length over all, 107″.29.
Gauged length, 100″.
Weight, 263½ pounds.
Counter-weight at middle, 132 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0062	.....	0.	—.00½	
20,000	.0107	.....	0.	—.00½	
30,000	.0145	.....	0.	—.00½	
40,000	.0181	.....	0.	—.01	
50,000	.0220	.....	0.	—.01	
1,000	.....	.0005	0.	0.	
60,000	.0260	.....	0.	—.00½	
70,000	.0296	.....	0.	—.00½	
80,000	.0336	.....	0.	—.00½	
90,000	.0375	.....	0.	—.00½	
100,000	.0415	.....	0.	—.00½	
1,000	.....	0.	0.	0.	
110,000	.0459	.....	0.	—.00½	
120,000	.0490	.....	0.	—.00½	
130,000	.0530	.....	0.	—.00½	
140,000	.0571	.....	0.	—.00½	
150,000	.0610	.....	0.	—.00½	
1,000	.....	.0002	0.	0.	
160,000	.0654	.....	—.00½	—.00½	
170,000	.0700	.....	—.00½	—.01	
180,000	.0758	.....	—.01	—.02	
1,000	.....	.0019	0.	0.	
190,000	.....	.....	—.05	—.07	
194,900	.....	.....	.....	.....	Ultimate strength = 21,870 pounds per square inch.
Deflected suddenly at		.....	—.30	.....	
Springing to		.....	—1.84	—.20	

Scale disturbed in front of 1½″ pins.

No. 1625.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 107″.56.
Length over all, 107″.30.
Gauged length, 100″.
Weight, 264 pounds.
Counter-weight at middle, 132 pounds.
Sectional area (2″.97 horizontal × 2″.99 vertical), 8.88 square inches.

Loads Applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0072	.....	0.	—.00½	
20,000	.0116	.....	0.	—.00½	
30,000	.0157	.....	0.	—.00½	
40,000	.0192	.....	0.	—.00½	
50,000	.0231	.....	0.	—.00½	
1,000	.....	0.	0.	+.01	
60,000	.0270	.....	0.	—.00½	
70,000	.0310	.....	0.	—.00½	
80,000	.0350	.....	0.	—.00½	
90,000	.0390	.....	0.	—.00½	
100,000	.0430	.....	0.	—.00½	
1,000	.....	0.	0.	+.01	
110,000	.0465	.....	.00½	0.	
120,000	.0501	.....	.00½	0.	
130,000	.0540	.....	.00½	0.	
140,000	.0580	.....	.02	0.	
150,000	.0619	.....	.04	0.	
1,000	.....	0.	0.	+.01	
160,000	.0655	.....	.05	0.	
170,000	.0694	.....	.09	0.	
180,000	.....	.....	.13	—.01	
186,100	.....	.....	.26	—.03	Ultimate strength = 20,960 pounds per square inch.
Deflected suddenly at.....		.....	.42	.....	
Springing to		.....	1.78	.....	

Scale disturbed in front of 1½″ pins.

No. 1622.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 113″.63.
Length, over all, 113″.35.
Gauged length, 100″.
Weight, 278½ pounds.
Counter-weight at middle, 139 pounds.
Sectional area (2″.98 horizontal × 2″.98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0066	.....	0.	—.00½	
20,000	.0115	.....	0.	—.00½	
30,000	.0155	.....	0.	—.00½	
40,000	.0192	.....	0.	—.00½	
50,000	.0230	.....	0.	—.00½	
1,000	.....	0.	0.	0.	
60,000	.0270	.....	0.	—.00½	
70,000	.0309	.....	0.	—.00½	
80,000	.0348	.....	—.00½	—.00½	
90,000	.0385	.....	—.00½	—.00½	
100,000	.0425	.....	—.01	—.00½	
1,000	.....	.0002	0.	+.00½	
110,000	.0460	.....	—.02	0.	
120,000	.0500	.....	—.03	0.	
130,000	.0535	.....	—.04	0.	
140,000	.0572	.....	—.06	0.	
150,000	.0610	.....	—.07	0.	
1,000	.....	.0002	0.	+.00½	
160,000	.....	.....	—.09	0.	
170,000	.....	.....	—.17	0.	
175,300	.....	.....	—.31	0.	Ultimate strength = 19,740 pounds per square inch.

Deflected suddenly when horizontal deflection reached —″.50, springing to —1″.67.
Scale disturbed in front of 1½″ pins.

No. 1623.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 113″.63.
Length over all, 113″.35.
Gauged length, 100″.
Weight, 278 pounds.
Counter-weight at middle, 139 pounds.
Sectional area (2″.98 horizontal × 2″.98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0049	.....	0.	0.	
20,000	.0093	.....	0.	0.	
30,000	.0135	.....	0.	0.	
40,000	.0172	.....	.00½	0.	
50,000	.0209	.....	.00½	0.	
1,000	.....	.0002	0.	0.	
60,000	.0247	.....	.00½	0.	
70,000	.0285	.....	.00½	0.	
80,000	.0321	.....	.00½	0.	
90,000	.0360	.....	.00½	0.	
100,000	.0400	.....	.01	0.	
1,000	.....	.0005	0.	0.	
110,000	.0435	.....	.01	.01	
120,000	.0472	.....	.01	.01	
130,000	.0507	.....	.02	.02	
140,000	.0540	.....	.02	.02	
150,000	.0573	.....	.04	.03	
1,000	.....	0.	0.	0.	
160,000	.....	.....	.04	.03	
170,000	.....	.....	.06	.05	
180,000	.....	.....	.10	.08	
186.950	.....	.....	.26	.14	Ultimate strength = 21,050 pounds per square inch.
Deflected suddenly at	.....	.48	.....	.....	
Springing to	.....	1.92	.....	.....	

Scale disturbed in front of 1½″ pins.

No. 1620.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 119".60.
Length over all, 119".32.
Gauged length, 100".
Weight, 293 pounds.
Counter-weight at middle, 147 pounds.
Sectional area (2".98 horizontal × 2".98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0050	.....	0.	—.01	
20,000	.0096	.....	0.	—.02	
30,000	.0136	.....	0.	—.02	
40,000	.0175	.....	0.	—.02	
50,000	.0213	.....	0.	—.02	
1,000	.....	.0006	0.	.00½	
60,000	.0250	.....	0.	—.02	
70,000	.0288	.....	0.	—.02	
80,000	.0327	.....	0.	—.02	
90,000	.0365	.....	0.	—.02	
100,000	.0405	.....	0.	—.02	
1,000	.....	.0005	0.	—.00½	
110,000	.0440	.....	0.	—.01	
120,000	.0476	.....	—.01	—.01	
130,000	.0510	.....	—.01	—.00½	
140,000	.0548	.....	—.02	0.	
150,000	.0580	.....	—.04	0.	
1,000	.....	.0002	0.	0.	
160,000	.....	.....	—.04	.00½	
170,000	.....	.....	—.08	.01	
172,200	.....	.....	—.10	.02	
180,000	.....	.....	—.15	.05	
183,500	.....	.....	—.30	.08	Ultimate strength = 20,660 pounds per square inch.

Sprung suddenly when horizontal deflection reached —".64
Scale disturbed in front of $1\frac{1}{2}''$ pins.

No. 1621.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 119″.60.
Length over all, 119″.34.
Gauged length, 100″.
Weight, 293 pounds.
Counter-weight at middle, 147 pounds.
Sectional area (2″.98 horizontal × 2″.99) vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0050	.....	0.	—.01	
20,000	.0091	.....	0.	—.02	
30,000	.0132	.....	0.	—.02	
40,000	.0170	.....	0.	—.02	
50,000	.0208	.....	0.	—.02	
1,000	.....	0.	0.	0.	
60,000	.0245	.....	0.	—.02	
70,000	.0285	.....	0.	—.02	
80,000	.0325	.....	0.	—.02	
90,000	.0361	.....	0.	—.02	
100,000	.0402	.....	.01	—.02	
1,000	.....	—.0005	0.	0.	
110,000	.0444	.....	.01	—.02	
120,000	.0475	.....	—.01	—.02	
130,000	.0510	.....	—.02	—.01	
140,000	.0546	.....	.04	—.01	
150,000	.0580	.....	.06	—.00½	
1,000	.....	—.0011	0.	0.	
160,000	.....	.....	.06	0.	
170,000	.....	.....	.10	.00½	
180,000	.....	.....	.26	.03	Ultimate strength = 20,200 pounds per square inch.

When horizontal deflection reached ″.53 bar suddenly deflected to 1″.90.
Scale started in front of 1½″ pins.

No. 1618.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 125″.63.
Length over all, 125″.40.
Gauged length, 100″.
Weight, 313½ pounds.
Counter-weight at middle, 157 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0065	.....	0.	—.02	
20,000	.0108	.....	—.00½	—.02	
30,000	.0150	.....	—.00½	—.02	
40,000	.0188	.....	—.00½	—.02	
50,000	.0228	.....	—.01	—.02	
1,000	.....	.0005	0.	0.	
60,000	.0267	.....	—.02	—.02	
70,000	.0308	.....	—.02	—.03	
80,000	.0348	.....	—.04	—.03	
90,000	.0390	.....	—.05	—.03	
100,000	.0430	.....	—.06	—.03	
1,000	.....	.0005	0.	0.	
110,000	.0470	.....	—.06	—.03	
120,000	.0510	.....	—.08	—.03	
130,000	.0554	.....	—.10	—.03	
140,000	.0595	.....	—.12	—.03	
150,000	.0640	.....	—.20	—.04	
156,600	.....	.....	—.36	—.04	Ultimate strength = 17,580 pounds per square inch.
When deflection reached —.52 horizontal, sprung suddenly, increasing deflections to —1.67 horizontal, 0. vertical.					
1,000	.....	.....	—.57	.....	Load released.

No. 1619.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 125″.64.
Length over all, 125″.37.
Gauged length, 100″.
Weight, 308 pounds.
Counter-weight at middle, 154 pounds.
Sectional area (2″.98 horizontal × 2″.98 vertical), 8.88 square inches

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	.0	.....	0.	0.	
10,000	.0050	.....	0.	—.02	
20,000	.0095	.....	0.	—.02	
30,000	.0136	.....	0.	—.02	
40,000	.0177	.....	0.	—.02	
50,000	.0215	.....	—.00½	—.02	
1,000	.....	0.	0.	0.	
60,000	.0245	.....	—.00½	—.02	
70,000	.0295	.....	—.01	—.02	
80,000	.0334	.....	—.01	—.02	
90,000	.0374	.....	—.01	—.02	
100.000	.0414	.....	—.01	—.02	
1,000	.....	.0004	0.	0.	
110,000	.0451	.....	—.02	—.02	
120,000	.0490	.....	—.02	—.02	
130,000	.0531	.....	—.03	—.02	
140,000	.0570	.....	—.04	—.02	
150,000	.0615	.....	—.05	—.02	
1,000	.....	.0006	0.	0.	
160,000	.....	.....	—.05	—.03	
170,000	.....	.....	—.08	—.05	
180,000	.....	.....	—.15	—.05	
182,800	.....	.....	—.28	—.08	Ultimate strength = 20,590 pounds per square inch.
Sprung suddenly when deflection reached			—.48	.....	

No. 1616.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 131″.70.
Length over all, 131″.45.
Gauged length, 100″.
Weight, 321½ pounds.
Counter-weight at middle, 160 pounds.
Sectional area (3″ horizontal × 2″.96 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0042	.....	0.	—.01	
20,000	.0088	.....	0.	—.01	
30,000	.0125	.....	0.	—.01	
40,000	.0164	.....	0.	—.01	
50,000	.0203	.....	0.	—.01	
1,000	.....	—.0003	0.	0.	
60,000	.0240	.....	0.	—.01	
70,000	.0280	.....	0.	—.01	
80,000	.0320	.....	0.	—.01	
90,000	.0364	.....	—.00½	—.01	
100,000	.0404	.....	—.00½	—.01	
1,000	.....	—.0005	0.	0.	
110,000	.0440	.....	—.00½	—.01	
120,000	.0482	.....	—.00½	—.01	
130,000	.0523	.....	—.00½	—.01	
140,000	.0568	.....	—.00½	—.01	
150,000	.0614	.....	—.00½	—.02	
1,000	.....	—.0005	0.	0.	
160,000	.....	.....	—.02	—.04	
170,000	.....	.....	—.04	—.06	
180,000	.....	.....	—.07	—.13	
185,000	.....	.....	—.17	—.23	Ultimate strength = 20,830 pounds per square inch.
Horizontal deflection increased to —″.40, when post suddenly sprung to —2″.32 horizontal, —″.30 vertical.					
When load was released recovered to—					
1,000	.....	.....	—.91	—.23	

No. 1617.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 131″.70.
Length over all, 131″.44.
Gauged length, 100″.
Weight, 322 pounds.
Counter-weight at middle, 160 pounds.
Sectional area (3″.01 horizontal × 2″.95 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0050	.....	.00½	0.	
20,000	.0090	.....	.00½	0.	
30,000	.0130	.....	.01	0.	
40,000	.0170	.....	.01	0.	
50,000	.0210	.....	.01	0.	
1,000	.....	.0010	0.	0.	
60,000	.0250	.....	.01	0.	
70,000	.0290	.....	.01	0.	
80,000	.0330	.....	.01	0.	
90,000	.0371	.....	.01	0.	
100,000	.0414	.....	.01	0.	
1,000	.....	.0010	0.	0.	
110,000	.0452	.....	.01	0.	
120,000	.0495	.....	.01	0.	
130,000	.0537	.....	.02	0.	
140,000	.0580	.....	.03	0.	
150,000	.0625	.....	.06	−.01	
1,000	.....	.0015	0.	0.	
160,000	.....	.....	.09	−.02	
170,000	.....	.....	.15	−.04	
172,900	.....	.....	.26	−.07	Ultimate strength = 19,470 pounds per square inch.

Sprung suddenly when deflection reached ″.30 horizontal.

No. 1614.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 137″.65.
Length over all, 137″.40.
Gauged length, 100″.
Weight, 340 pounds.
Counter-weight at middle, 170 pounds.
Sectional area (2″.98 horizontal × 2″.97 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0026	.....	0.	.00½	
20,000	.0061	.....	—.00½	.00½	
30,000	.0100	.....	.00½	.00½	
40,000	.0140	.....	.00½	.00½	
50,000	.0176	.....	—.01	.01	
1,000	.....	—.0004	0.	0.	
60,000	.0212	.....	—.03	.01	
70,000	.0248	.....	—.04	.01	
80,000	.0285	.....	—.05	.01½	
90,000	.0324	.....	—.06	.01½	
100,000	.0365	.....	—.06	.01½	
1,000	.....	—.0005	0.	0.	
110,000	.0400	.....	—.07	.02	
120,000	.0436	.....	—.08	.02	
130,000	.0475	.....	—.10	.02	
140,000	.....	.....	—.15	.02	
150,000	.....	.....	—.25	.02	
154,150	.....	.....	—.42	.02	Ultimate strength = 17,420 pounds per square inch.
.....	.....	.....	.55	.02	
Sprung suddenly to			1.98		
1,000	.....	.....	.60	.....	Load released.

No. 1615.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 137″.66.
Length over all, 137″.40.
Gauged length, 100″.
Weight, 337½ pounds.
Counter-weight at middle, 169 pounds.
Sectional area (2″.99 horizontal × 2″.96 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pound.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0029	.....	0.	0.	
20,000	.0066	.....	0.	0.	
30,000	.0106	.....	0.	0.	
40,000	.0144	.....	0.	0.	
50,000	.0181	.....	0.	0.	
1,000	.....	—.0002	0.	0.	
60,000	.0220	.....	0.	0.	
70,000	.0257	.....	0.	0.	
80,000	.0295	.....	0.	0.	
90,000	.0335	.....	0.	0.	
100,000	.0380	.....	0.	0.	
1,000	.....	—.0010	0.	0.	
110,000	.0415	.....	.01	0.	
120,000	.0455	.....	.02	0.	
130,000	.0495	.....	.05	0.	
140,000	.....	.....	.09	—.01	
150,000	.....	.....	.11	—.01	
160,000	.....	.....	.22	—.03	
160,500	.....	.....	.30	—.03	Ultimate strength = 18,140 pounds per square inch.

Sprung suddenly after passing the maximum load.

No. 1612.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 143″.82.
Length over all, 143″.59.
Gauged length, 100″.
Weight, 352 pounds.
Counter-weight at middle, 176 pounds.
Sectional area (2″.96 horizontal × 2.″98 vertical), 8.82 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0049	.....	0.	—.01½	
20,000	.0093	.....	0.	—.01½	
30,000	.0135	.....	0.	—.01½	
40,000	.0173	.....	0.	—.01½	
50,000	.0213	.....	0.	—.01½	
1,000	.....	.0020	0.	0.	
60,000	.0254	.....	—.00½	—.01½	
70,000	.0292	.....	.00½	.01½	
80,000	.0335	.....	—.01	—.01	
90,000	.0378	.....	.01½	.01½	
100,000	.0419	.....	—.02	.01½	
1,000	.....	.0022	0.	0.	
110,000	.0457	.....	—.05	—.01	
120,000	.0500	.....	—.06½	—.01	
130,000	.0535	.....	—.08	—.01	
140,000	.....	.....	—.11	—.02	
150,000	.....	.....	—.19	—.02	
154,300	.....	.....	—.35	—.02	Ultimate strength = 17,490 pounds per square inch.
Deflected suddenly when horizontal deflection reached —.42 horizontal, increasing to —2.13.					
1,000	.....	.....	—.41	.....	Load released.

No. 1613.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 143″.82.
Length over all, 143″.59.
Gauged length, 100″.
Weight, 353 pounds.
Counter-weight at middle, 176 pounds.
Sectional area (2″.97 horizontal × 2.″99 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0089	.....	0.	—.05	
20,000	.0118	.....	—.00½	—.06	
30,000	.0159	.....	—.00½	—.06	
40,000	.0197	.....	—.01	—.06	
50,000	.0236	.....	—.02	—.06	
1,000	.....	.0007	0.	0.	
60,000	.0281	.....	—.03	—.06	
70,000	.0320	.....	—.03	—.06	
80,000	.0360	.....	—.05	—.07	
90,000	.0405	.....	—.06	—.07	
100,000	.0445	.....	—06	—.07	
1,000	.....	.0010	0.	0.	
110,000	.0485	.....	—.06	—.07	
120,000	.0526	.....	—.08	—.08	
130,000	.0570	.....	—.10	—.09	
140,000	.....	.....	—.12	—.09	
150,000	.....	.....	—.18	—.10	
157,280	.....	.....	—.37	—.11	Ultimate strength=17,710 pounds per square inch.
Sudden springing at —″.50 horizontal, deflecting to —2″.20 horizontal, —″.12 vertical.					
1,000	Recovered to	.....	—.43	—.05	

No. 1610.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 149″.79.
Length over all, 149″.53.
Gauged length, 100″.
Weight, 369 pounds.
Counter-weight at middle, 184 pounds.
Sectional area (2″.99 horizontal × 2″.98 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0040	.....	0.	—.01	
20,000	.0086	.....	—.01	—.01	
30,000	.0125	.....	—.02	—.01	
40,000	.0165	.....	—.03	—.01	
50,000	.0202	.....	—.04	—.01	
1,000	.....	0.	0.	0.	
60,000	.0244	.....	—.06	—.01	
70,000	.0283	.....	—.07	—.01	
80,000	.0323	.....	—.08	—.01	
90,000	.0365	.....	—.09	—.01	
100,000	.0406	.....	—.10	—.91	
1,000	.....	0.	0.	0.	
110,000	.0444	.....	—.11	—.01	
120,000	.0488	.....	—.14	—.02	
130,000	.....	.....	—.18	—.02	
140,000	.....	.....	—.24	—.02	
147,180	.....	.....	—.40	—.02	Ultimate strength = 16,520 pounds per square inch.

When horizontal deflection reached —″.46 the post suddenly sprung to —2″.16.

No. 1611.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 149″.77.
Length over all, 149″.53.
Gauged length, 100″.
Weight, 365 pounds.
Counter-weight at middle, 182 pounds.
Sectional area (2″.99 horizontal × 2″.98 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0012	.....	0.	.04	
20,000	.0046	.....	0.	.06	
30,000	.0086	.....	0.	.06	
40,000	.0125	.....	—.00½	.07	
50,000	.0160	.....	—.00½	.07	
1,000	.....	—.0006	0.	.02½	
60,000	.0197	.....	—.00½	.07	
70,000	.0232	.....	—.01	.08	
80,000	.0270	.....	—.01	.08	
90,000	.0310	.....	—.01	.09	
100,000	.0345	.....	—.01	.09	
1,000	.....	—.0007	0.	.03	
110,000	.0385	.....	—.02	.09	
120,000	.0421	.....	—.03	.10	
130,000	.0455	.....	—.05	.10	
140,000	.....	.....	—.06	.11	
150,000	.....	.....	—.10	.13	
158,950	.....	.....	—.30	.....	Ultimate strength = 17,840 pounds per square inch.

Sustained maximum load till the horizontal deflection reached —.50 when the post suddenly sprung to 2″.43. Vertical ″.06.
Load released to 1,000 pound. Horizontal deflection —″.72.

No. 1608.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 155″.76.
Length over all, 155″.50.
Gauged length, 150″.
Weight, 381½ pounds.
Counter-weight at middle, 190 pounds.
Sectional area (2″.95 horizontal × 2″.95 vertical), 8.70 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0113	.....	0.	—.06	
20,000	.0175	.....	0.	—.06	
30,000	.0236	.....	0.	—.06	
40,000	.0298	.....	0.	—.07	
50,000	.0359	.....	0.	—.07	
1,000	.....	.0011	0.	—.01	
60,000	.0417	.....	0.	—.07	
70,000	.0475	.....	0.	—.08	
80,000	.0535	.....	0.	—.08	
90,000	.0595	.....	0.	—.08	
100,000	.0651	.....	0.	—.08	
1,000	.....	.0011	0.	—.01	
110,000	.0710	.....	0.	—.08½	
120,000	.0770	.....	0.	—.09	
130,000	.0830	.....	0.	—.09	
140,000	.....	.....	0.	—.11	
150,000	.....	.....	.03	—.12	
160,000	.....	.....	.14	—.15	Ultimate strength = 18,390 pounds per square inch.
Deflected suddenly when horizontal deflection reached ″.30 increasing the deflection to 2″.60.					
1,000	.....	.....	.50	—.16	
10,000	.....	.....	.55	—.21	
20,000	.....	.....	.60	—.21	
30,000	.....	.....	.69	—.21	
40,000	.....	.....	.80	—.21	
50,000	.....	.....	1.03	—.23	
60,000	.....	.....	1.53	—.25	
65,500	.....	.....	2.60	—.28	Maximum load sustained after above deflections.

No. 1609.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 155″.74.
Length over all, 155″.50.
Gauged length, 150″.
Weight, $381\frac{1}{2}$ pounds.
Counter-weight at middle, 190 pounds.
Sectional area (2″.99 horizontal × 2″.96 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0062	.....	0.	—.02½	
20,000	.0145	.....	0.	—.02½	
30,000	.0206	.....	0.	—.03	
40,000	.0269	.....	0.	—.03	
50,000	.0329	.....	—.00½	—.03	
1,000	.....	.0004	0.	0.	
60,000	.0390	.....	—.01	—.04	
70,000	.0449	.....	—.01	—.04	
80,000	.0510	.....	—.01	—.05	
90,000	.0570	.....	—.02	.....	
100,000	.0630	.....	—.04	—.06	
1,000	.....	.0006	0.	0.	
110,000	.0694	.....	—.05	—.06	
120,000	.0755	.....	—.06	—.07	
130,000	.0818	.....	—.08	—.08	
140,000	.....	.....	—.11	—.11	
150,000	.....	.....	—.26	—.16	Ultimate strength = 16,950 pounds per square inch.

Sudden springing when horizontal deflection reached — ″.37, increasing deflections to — 2″.35 horizontal, — ″.19 vertical.

No. 1606.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 161″.81.
Length over all, 161″.54.
Gauged length, 150″.
Weight, 397½ pounds.
Counter-weight at middle, 198 pounds.
Sectional area (2″.98 horizontal × 2″98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0058	.....	0.	—.01	
20,000	.0120	.....	0.	—.01	
30,000	.0180	.....	0.	—.01	
40,000	.0240	.....	.00½	—.01	
50,000	.0298	.....	.00½	—.01	
1,000	.....	.0015	0.	0.	
60,000	.0360	.....	.01	—.01	
70,000	.0420	.....	.01	—.01	
80,000	.0479	.....	.01	—.01	
90,000	.0538	.....	.01	—.01	
100,000	.0600	.....	.02	—.02	
1,000	.....	.0015	0.	0.	
110,000	.0657	.....	.05	—.02	
120,000	.....	.....	.06	—.03	
130,000	.....	.....	.09	—.04	
140,000	.....	.....	.14	—.05	
147,300	.....	.....	.30	.....	Ultimate strength = 16,590 pounds per square inch.
Deflected suddenly.					
60,000	.....	.....	2.48	—.07	Load and deflections after sudden deflection.
Strain released.					
1,000	.....	.....	.35	—.04	
65,000	.....	About ...	2.80	.....	Maximum load sustained after above deflections.

The yielding of the bar upon the application of the load, immediately after the ultimate strength had been determined, was rapid, but without sudden yielding.

No. 1607.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 161″.81.
Length over all, 161″.56.
Gauged length, 150″.
Weight, 391 pounds.
Counter-weight at middle, 195 pounds.
Sectional area (2″.96 horizontal × 2″.97 vertical), 8.79 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0044	.....	0.	0.	
20,000	.0103	.....	0.	.00½	
30,000	.0164	.....	0.	.00½	
40,000	.0221	.....	0.	.01	
50,000	.0282	.....	0.	.01	
1,000	.....	.0025	0.	0.	
60,000	.0341	.....	0.	.01	
70,000	.0402	.....	0.	.01	
80,000	.0461	.....	0.	.01	
90,000	.0520	.....	0.	.01	
100,000	.0578	.....	—.00½	.01	
1,000	.....	.0025	0.	.00½	
110,000	.0640	.....	0.	.01	
120,000	.0695	.....	0.	.02	
130,000	.....	.....	.00½	.02	
140,000	.....	.....	.04	.02	
148,200	.....	.....	.24	.....	Ultimate strength = 16,860 pounds per square inch.

Deflected suddenly at ″.32 horizontal, increasing deflection to 2″.53 horizontal.

No. 1604.

(Tested with two pin ends.)

Length, center to center, of $1\frac{1}{2}''$ pins, 167".76.
Length over all, 167".50.
Gauged length, 150".
Weight, 412 pounds.
Counter-weight at middle, 206 pounds.
Sectional area (2".96 horizontal × 3" vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0050	.....	—.00½	0.	
20,000	.0110	.....	.00½	0.	
30,000	.0174	.....	—.01	0.	
40,000	.0230	.....	—.02	0.	
50,000	.0290	.....	—.04	0.	
1,000	.....	.0006	0.	0.	
60,000	.0354	.....	—.06	0.	
70,000	.0413	.....	—.06	—.00½	
80,000	.0475	.....	—.07	—.01	
90,000	.0535	.....	—.07	—.01	
100,000	.0595	.....	—.09	—.01	
1,000	.....	.0008	0.	0.	
110,000	.....	.....	—.10	—.02	
120,000	.....	.....	—.11	—.03	
130,000	.....	.....	—.17	—.05	
140,000	.....	.....	—.29	—.06	
141,050	.....	About	—.40	.....	Ultimate strength = 15,880 pounds per square inch.

Deflected suddenly to 2".60 horizontal, after passing the maximum load.

Load released to initial load, 1,000 pounds horizontal deflection, —".45.

Load sustained after above deflection, 59,500 pounds; horizontal deflection about — 2".60.

No. 1605.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 167″.75.
Length over all, 167″.50.
Gauged length, 150″.
Weight, 410½ pounds.
Counter-weight at middle, 205 pounds.
Sectional area (2″.95 horizontal × 3″ vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0065	.....	0.	—.01	
20,000	.0127	.....	—.00½	—.01	
30,000	.0188	.....	—.00½	—.02	
40,000	.0245	.....	—.01	—.02	
50,000	.0310	.....	—.01	—.02	
1,000	.....	.0002	0.	0.	
60,000	.0370	.....	—.01	—.03	
70,000	.0430	.....	—.01	—.03	
80,000	.0490	.....	—.01	—.03	
90,000	.0550	.....	—.01	—.03	
100,000	.0609	.....	—.02	—.04	
1,000	.....	.0007	0.	0.	
110,000	.....	.....	—.03	—.05	
120,000	.....	.....	—.02	—.06	
130,000	.....	.....	—.02	—.07	
140,000	.....	.....	—.02	—.09	
150,000	.....	.....	—.02	—.14	
158,600	.....	.....	—.22	—.28	Ultimate strength = 17,920 pounds per square inch.
Deflected suddenly to —2″.97 horizontal, —″.16 vertical, load dropping to 46,000 pounds. Strains released to initial load.					
1,000	.....	.....	—.82	—.11	

No. 1602.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 173″.60.
Length over all, 173″.35.
Gauged length, 150″.
Weight, 425 pounds.
Counter-weight at middle, 212 pounds.
Sectional area (2″.98 horizontal × 2″.98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0040	.....	0.	.00½	
20,000	.0100	.....	0.	.00½	
30,000	.0158	.....	0.	.01	
40,000	.0213	.....	0.	.01	
50,000	.0272	.....	0.	.01½	
1,000	.....	0.	0.	0.	
60,000	.0332	.....	.00½	.02	
70,000	.0391	.....	.01	.02	
80,000	.0450	.....	.03	.03	
90,000	.0505	.....	.04	.04	
100,000	.0564	.....	.07	.04	
110,000	.....	.....	.10	.03	
120,000	.....	.....	.17	.03	
124,950	.....	.....	.35	.....	Ultimate strength = 14,070 pounds per square inch.

Deflected suddenly to 2″.40 horizontal.

No. 1603.

(Tested with two pins ends.)

Length, center to center, of 1½″ pins, 173″.62.
Length over all, 173″.33.
Gauged length, 150″.
Weight, 424 pounds.
Counter-weight at middle, 212 pounds.
Sectional area (2″.98 horizontal × 2″.97 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0045	.....	0.	.00½	
20,000	.0106	.....	0.	.01	
30,000	.0168	.....	0.	.01	
40,000	.0224	.....	0.	.01	
50,000	.0282	.....	—.00½	.00½	
1,000	.....	0.	0	.00½	
60,000	.0350	.....	—.01	.00½	
70,000	.0410	.....	—.01	0.	
80,000	.0470	.....	—.03	0.	
90,000	.0531	.....	—.05	0.	
100,000	.0598	.....	—.06	—.01	
110,000	.....	.....	—.08	—.03	
120,000	.....	.....	—.10	—.05	
130,000	.....	.....	—.20	—.10	
132,600	.....	.....	—.35	.....	Ultimate strength = 14,980 pounds per square inch.

Deflected suddenly to —2″.60 horizontal.

No. 1600.

(Tested with two pin ends.)

Length, center to center, of 1½″ pins, 179″.50.
Length over all, 179″.26.
Gauged length, 150″.
Weight, 435 pounds.
Counter-weight at middle, 217 pounds.
Sectional area (2″.99 horizontal × 2″.94 vertical), 8.79 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	.0	.....	0.	0.	
10,000	.0040	.....	0.	0.	
20,000	.0100	.....	0.	0.	
30,000	.0160	.....	0.	0.	
40,000	.0220	.....	0.	0.	
50,000	.0280	.....	.00½	0.	
1,000	.....	0.	0.	0.	
60,000	.0340	.....	.01	0.	
70,000	.0402	.....	.02	0.	
80,000	.0460	.....	.04	0.	
90,000	.....	.....	.07	0.	
100,000	.....	.....	.10	—.01	
110,000	.....	.....	.17	—.01	
114,850	.....	.....	.30	—.01	Ultimate strength = 13,010 pounds per square inch.

When maximum load was reached post deflected suddenly to 2″.28 horizontal, —″.07 vertical, the load falling to 51,000 pounds.

Load increased to 54,000 pounds, increasing deflection to 2″.50 horizontal.

Load released to 1,000 pounds; deflections, horizontal ″.13 vertical —″.02.

Loads again applied: 64,500 pounds; deflection, horizontal ″.31; sudden yielding increasing deflections to horizontal 1″.10, vertical —″.05.

No. 1601.

(Tested with two pin ends.)

Length, center to center, of pins, 179″.46.
Gauged length, 150″.
Weight, 441 pounds.
Counter-weight at middle, 220 pounds.
Sectional area (2″.98 horizontal × 2″.98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0042	.....	0.	⌐.01	
20,000	.0100	.....	0.	⌐.01	
30,000	.0160	.....	0.	⌐.01	
40,000	.0220	.....	0.	⌐.01	
50,000	.0280	.....	0.	⌐.01	
1,000	.....	0.	0.	0.	
60,000	.0343	.....	0.	⌐.01	
70,000	.0403	.....	0.	⌐.01	
80,000	.0468	.....	0.	⌐.01	
90,000	.0527	.....	0.	⌐.01	
100,000	.....	.....	0.	⌐.03	
110,000	.....	.....	0.	⌐.04	
120,000	.....	.....	0.	⌐.05	
130,000	.....	.....	.04	⌐.06	
139,400	.....	About	.32	.....	Ultimate strength = 15,700 pounds per square inch.
Deflected suddenly to 2″.70 horizontal.					
Load released to initial—					
1,000	.....	.....	.30	.....	
Loads again applied—					
56,000	.....	.....	.....	.....	Maximum load now sustained.

The horizontal deflection increased from 1″ to 2″.70 when the load was passing from 55,000 pounds to 56,000 pounds. The deflections increasing rapidly, but without the sudden springing after the ultimate load, 139,400 pounds, was reached.

No. 760.

(Tested with two flat ends.)

Total length, 89″.50.
Gauged length, 80.″
Weight, 222 pounds.
Counter-weight at middle, 111 pounds.
Sectional area (2″.99 horizontal × 2″.98 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0026	.....	.01	0.	
20,000	.0056	.....	.01	0.	
30,000	.0085	.....	.02	0.	
40,000	.0117	.....	.03	0.	
50,000	.0148	.....	.03	0.	
1,000	.....	0.	0.	0.	
60,000	.0180	.....	.03	0.	
70,000	.0210	.....	.03	0.	
80,000	.0240	.....	.03	0.	
90,000	.0270	.....	.04	0.	
100,000	.0300	.....	.04	0.	
1,000	.....	0.	0.	0.	
110,000	.0330	.....	.04	0.	
120,000	.0361	.....	.04	0.	
130,000	.0393	.....	.04	0.	
140,000	.0422	.....	.04	0.	
150,000	.0450	.....	.04	.01	
1,000	.....	0.	0.	0.	
160,000	.0490	.....	.04	.01	
170,000	.0517	.....	.04	.....	
180,000	.0550	.....	.04	.....	
190,000	.0580	.....	.04	.....	
200,000	.0613	.....	.04	.....	
1,000	.....	.0009	.01	.01	
210,000	.0650	.....	.....	.....	
220,000	.0695	.....	.04	.01	
230,000	.0738	.....	.05	0.	
238,000	.0835	.....	.10	—.02	Ultimate strength = 26,730 pounds per square inch.

Deflected horizontally.

No. 761.

(Tested with two flat ends.)

Total length, 89″.56.
Gauged length, 80″.
Weight, 222 pounds.
Counter-weight at middle, 111 pounds.
Sectional area (2″.99 horizontal × 2″.98 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0042	.....	0.	0.	
20,000	.0075	.....	0.	0.	
30,000	.0109	.....	0.	0.	
40,000	.0139	.....	0.	0.	
50,000	.0170	.....	0.	0.	
1,000	.....	0.	0.	0.	
60,000	.0200	.....	.00½	0.	
70,000	.0230	.....	.00½	0.	
80,000	.0262	.....	.00½	0.	
90,000	.0293	.....	.00½	0.	
100,000	.0323	.....	.01	0.	
1,000	.....	0.	0.	0.	
110,000	.0355	.....	.01	0.	
120,000	.0385	.....	.01	0.	
130,000	.0416	.....	.01	0.	
140,000	.0448	.....	.01	0.	
150,000	.0479	.....	.01	0.	
1,000	.....	0.	0.	0.	
160,000	.0510	.....	.01	0.	
170,000	.0540	.....	.01	0.	
180,000	.0571	.....	.01	0.	
190,000	.0605	.....	.01	0.	
200,000	.0640	.....	.01	0.	
1,000	.....	.0020	0.	0.	
210,000	.0685	.....	.01	0.	
220,000	.0724	.....	.01	0.	
227,900	.0784	.....	.07	0.	Ultimate strength = 25,580 pounds per square inch.

Deflected horizontally.

No. 744.

(Tested with two flat ends.)

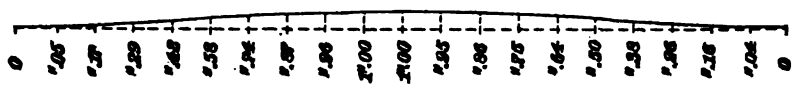
Total length, 119″.38.
Gauged length, 100″.
Weight, 296 pounds.
Counter-weight at middle, 147 pounds.
Sectional area (2″.98 × 2″.99), 8.91 square inches; ″.003 packing under one end.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
5,000	0.	.....	0.	0.	
10,000	0.	.....	0.	0.	
20,000	.0030	.....	0.	0.	
30,000	.0076	.....	0.	0.	
40,000	.0120	.....	0.	0.	
50,000	.0160	.....	0.	0.	
1,000	.....	.0016	0.	0.	
60,000	.0198	.....	0.	0.	
70,000	.0237	.....	.01	0.	
80,000	.0278	.....	.02	0.	
90,000	.0312	.....	.02	0.	
100,000	.0351	.....	.02	0.	
1,000	.....	.0015	0.	0.	
110,000	.0391	.....	.02	0.	
120,000	.0430	.....	.03	0.	
130,000	.0467	.....	.04	0.	
140,000	.0505	.....	.04	0.	
150,000	.0543	.....	.04	0.	
160,000	.0581	.....	.05	0.	
170,000	.0625	.....	.06	0.	
180,000	.0667	.....	.07	.01	
190,000	.0710	.....	.08	.01	
200,000	.0758	.....	.10	.02	
1,000	.....	.0049	.02	0.	
205,000	.0803	.....	.20	.04	Ultimate strength = 23,010 pounds per square inch.

Deflected horizontally.
Scale generally started off bar.

Curve of flexure.

[Ordinates measured 6″ apart.]



No. 745.

(Tested with two flat ends.)

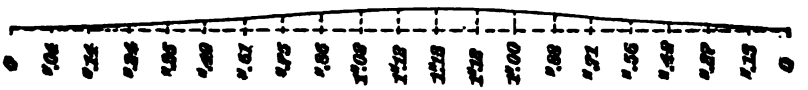
Total length, 119″.38.
Gauged length, 100″.
Weight, 295½ pounds.
Counter-weight at middle, 147 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
5,000	.0008	.....	0.	0.	
10,000	.0029	.....	0.	0.	
20,000	.0065	.....	0.	0.	
30,000	.0103	.....	.01	0.	
40,000	.0140	.....	.01	0.	
50,000	.0180	.....	.01	0.	
1,000	.....	—.0010	.0 +	0.	
60,000	.0216	.....	.01 +	0.	
70,000	.0255	.....	.02	0.	
80,000	.0295	.....	.02	0.	
90,000	.0330	.....	.02 +	0.	
100,000	.0373	.....	.03	0.	
1,000	.....	—.0010	0. +	0.	
110,000	.0412	.....	.03	0.	
120,000	.0450	.....	.03 +	0.	
130,000	.0490	.....	.04	0.	
140,000	.0530	.....	.04½	0.	
150,000	.0570	.....	.05	0.	
1,000	.....	—.0012	.06 +	0.	
160,000	.0612	.....	.06	0.	
170,000	.0655	.....	.06 +	0.	
180,000	.0700	.....	.06 +	0.	
190,000	.0770	.....	.08	—.01	
200,000	.0900	.....	.16	—.08	Ultimate strength = 22,450 pounds per square inch.
1,000	.....	.0208	.10	—.09	

Deflected horizontally and downward.

Curve of flexure.

[Ordinates measured 6″ apart.]



No. 762.

(Tested with one pin end and 1½″ pin end.)

Length, center of pin to flat-end, 89″.70.
Total length of bar, 89″.54.
Gauged length, 80″.
Weight, 221 pounds.
Counter-weight at middle, 111 pounds.
Deflections measured at middle.
Sectional area, (2″.98 horizontal × 2″.99 vertical) 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0020	.....	—.00½	0.	
20,000	.0050	.....	—.01	0.	
30,000	.0084	.....	—.01	0.	
40,000	.0115	.....	.....	0.	
50,000	.0148	.....	—.02	0.	
1,000	.....	0.	0.	0.	
60,000	.0180	.....	—.02	0.	
70,000	.0210	.....	—.02	0.	
80,000	.0240	.....	—.02	0.	
90,000	.0270	.....	—.02	0.	
100,000	.0300	.....	—.02	0.	
1,000	.....	0.	0.	0.	
110,000	.0330	.....	—.02	0.	
120,000	.0357	.....	—.02	0.	
130,000	.0388	.....	—.02	0.	
140,000	.0411	.....	—.02	0.	
150,000	.0440	.....	—.02	0.	
1,000	.....	0.	0.	0.	
160,000	.0470	.....	—.02	0.	
170,000	.0500	.....	—.03	0.	
180,000	.0530	.....	—.03	0.	
190,000	.0565	.....	—.03	0.	
200,000	.0600	.....	—.05	0.	
1,000	.....	.0005	0.	0.	
210,000	.0641	.....	—.05	0.	
220,000	.0689	.....	—.07	0.	
223,800	.0695	.....	—.09	.03	Ultimate strength = 25,120 pounds per square inch.

Deflected horizontally.
Maximum deflection 35″. from pin end.
Scale disturbed in front of 1½″ pin.

No. 763.

(Tested with one flat end, and one $1\frac{1}{2}''$ pin end.)

Length, center of pin to flat end, 89″.68.
Total length of bar, 89″.54.
Gauged length, 80″.
Weight, 222 pounds.
Counter-weight at middle, 111 pounds.
Sectional area (2″.99 horizontal × 2″.98 vertical), 8.91 square inches.
Deflections measured at middle.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0050	.....	—.00½	—.02	
20,000	.0093	.....	—.01	—.03	
30,000	.0126	.....	—.02	—.03	
40,000	.0162	.....	—.03	—.04	
50,000	.0195	.....	—.04	—.04	
1,000	.....	0.	0.	0.	
60,000	.0226	.....	—.04	—.04	
70,000	.0255	.....	—.04	—.04	
80,000	.0285	.....	—.04	—.04	
90,000	.0315	.....	—.04	—.04	
100,000	.0346	.....	—.04	—.04	
1,000	.....	0.	0.	0.	
110,000	.0370	.....	—.04	—.04	
120,000	.0400	.....	—.05	—.03	
130,000	.0425	.....	—.06	—.02	
140,000	.0451	.....	—.06	—.02	
150,000	.0479	.....	—.07	—.02	
1,000	.....	—.0005	0.	—.01	
160,000	.0502	.....	—.07	—.02	
170,000	.0530	.....	—.07	—.02	
180,000	.0555	.....	—.08	—.01½	
190,000	.0582	.....	—.09	—.01	
200,000	.0615	.....	—.09½	—.01	
1,000	.....	.0005	0.	—.01	
210,000	.0650	.....	—.10	—.01	
220,000	.0694	.....	—.12	—.01	
224,500	.0733	.....	—.16	—.01	Ultimate strength = 25,190 pounds per square inch.

Deflected horizontally.
Maximum deflection about $38\frac{1}{2}''$ from pin end.
Scale disturbed in front of $1\frac{1}{2}''$ pin.

No. 1598.

(Tested with one flat end and one 1½″ pin ends.)

Length, center of pin to flat end, 119.″48.
Total length of bar, 119″.33
Gauged length, 100″.
Weight, 295 pounds.
Counter-weight at middle, 147 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical), 8.91 square inches.
Deflections measured at middle.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0015	.....	.01	.00½	
20,000	.0050	.....	.02	.01	
30,000	.0088	.....	.02	.01	
40,000	.0124	.....	.02	.01	
50,000	.0163	.....	.02	.01	
1,000	.....	—.0002	0.	.00½	
60,000	.0200	.....	.02	.01½	
70,000	.0237	.....	.02	.02	
80,000	.0275	.....	.02	.02	
90,000	.0312	.....	.02	.02	
100,000	.0349	.....	.02	.02	
1,000	.....	—.0010	0.	.01	
110,000	.0389	.....	.02	.02	
120,000	.0421	.....	.02	.02	
130,000	.0459	.....	.02½	.02½	
140,000	.0494	.....	.03	.03	
150,000	.0530	.....	.03	.03	
1,000	.....	—.0019	0.	.01	
160,000	.0565	.....	.03	.03	
170,000	.0600	.....	.04	.03	
180,000	.0640	.....	.05	.04	
190,000	.0670	.....	.03	.05	
200,000	.0705	.....	.05	.09	Ultimate strength = 22,450 pounds per square inch.

Deflected horizontally.
Maximum deflection about .50″ from pin end.
Scale started off bar in front of 1½″ pin.

No. 1599.

(Tested with one flat end and one $1\frac{1}{2}''$ pin end.)

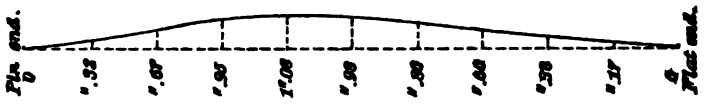
Length, center of pin to flat end, 119″.46.
Gauged length, 100″.
Weight, $294\frac{1}{2}$ pounds.
Counter-weight at middle, 147 pounds.
Sectional area (3″.99 horizontal × 2″.98 vertical), 8.91 square inches.
Deflections measured at middle.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0015	.....	.01	.00½	
20,000	.0049	.....	.02	.01	
30,000	.0085	.....	.02	.01	
40,000	.0124	.....	.03	.01½	
50,000	.0165	.....	.03	.01½	
1,000	.....	.0	0.	0.	
60,000	.0200	.....	.03	.01½	
70,000	.0240	.....	.03	.01½	
80,000	.0275	.....	.03	.01½	
90,000	.0311	.....	.03	.01½	
100,000	.0350	.....	.03	.01½	
1,000	.....	—.0002	0.	0.	
110,000	.0396	.....	.03	.02	
120,000	.0428	.....	.03	.03	
130,000	.0464	.....	.03	.03	
140,000	.0500	.....	.04	.04	
150,000	.0538	.....	.04	.04	
1,000	.....	—.0004	0.	0.	
160,000	.0576	.....	.05	.04	
170,000	.0611	.....	.06	.04	
180,000	.0650	.....	.08	.04	
190,000	.....	.....	.10	.04	
194,900	.....	.....	.18	.04	Ultimate strength = 21,870 pounds per square inch.

Horizontal deflection increased to 1″.60, then load released, and ordinates measured as below.

Curve of flexure.

[Ordinates every 12″.]



No. 742.

(Tested with two $\frac{7}{8}''$ pin ends.)

Length, center to center, of pins, 119″.68.
Weight, 295 pounds.
Counter-weight at middle, 147 pounds.
Sectional area (2″.99 horizontal × 2″.98 vertical), 8.91 square inches.
Gauged length, 100″.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
5,000	.0011	.....	0.	0.	
10,000	.0030	.....	0.	0.	
20,000	.0069	.....	0.	0.	
30,000	.0107	.....	0.	0.	
40,000	.0150	.....	0.	0.	
50,000	.0190	.....	0.	0.	
1,000	.....	0.	0.	0.	
60,000	.0230	.....	0.	0.	
70,000	.0267	.....	0.	0.	
80,000	.0306	.....	0.	0.	
90,000	.0345	.....	0.	0.	
100,000	.0381	.....	—.01	0.	
1,000	.....	0.	0.	0.	
110,000	.0420	.....	—.01	0.	
120,000	.0459	.....	—.03	0.	
130,000	.0497	.....	—.06	0.	
135,000	.....	.....	—.12	0.	
140,000	.....	.....	—.16	0.	
144,800	.....	.....	—.34	0.	Ultimate strength = 16,250 pounds per square inch.

Deflected horizontally. Scale disturbed in front of $\frac{7}{8}''$ pins.

Curve of flexure.

[Ordinates every 12″.]

No. 743.

(Tested with two $\frac{7}{8}''$ pin ends.)

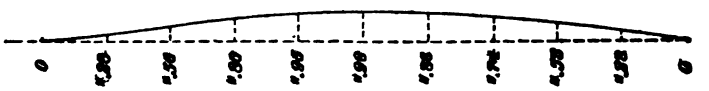
Length, center to center, of $\frac{7}{8}''$ pins, 119″.71.
Weight, 296 pounds.
Counter-weight at middle, 147 pounds.
Sectional area (2″.98 × 2″.99) 8.91 square inches.
Gauged length, 100″.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	.0	0.	
5,000	.0004	.....	.0	0.	
10,000	.0029	.....	.0	0.	
20,000	.0071	.....	.0	0.	
30,000	.0111	.....	.0	0.	
40,000	.0150	.....	.0	0.	
50,000	.0190	.....	.0	0.	
1,000	.....	.0008	.0	0.	
60,000	.0230	.....	.0	0.	
70,000	.0267	.....	.0	0.	
80,000	.0306	.....	.01	0.	
90,000	.0345	.....	.01+	0.	
100,000	.0382	.....	.02+	0.	
1,000	.....	0.	.0+	0.	
110,000	.0421	.....	.04	0.	
115,000	.....	.....	.05	0.	
120,000	.....	.....	.06	0.	
125,000	.....	.....	.07	0.	
130,000	.....	.....	.09	0.	
135,000	.....	.....	.12	0.	
140,000	.....	.....	.18	0.	
145,000	.....	.....	.31	0.	
145,400	.....	.....	.39	0.	Ultimate strength = 16,320 pounds per square inch.

Deflected horizontally.
Scale disturbed on bar in front of $\frac{7}{8}''$ pins.

Curve of flexure.

[Ordinates every 12″.]



No. 758.

(Tested with two pin ends.)

Length, center to center, of 1⅛″ pins, 119″.58.
Gauged length, 100″.
Weight, 294½ pounds.
Counter-weight at middle, 147 pounds.
Sectional area, (2″.99 horizontal × 2″.98 vertical) 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
5,000	.....	.....	.....	.....	
10,000	0.	.....	0.	.02	
20,000	.0033	.....	0.	.03	
30,000	.0070	.....	0.	.03	
40,000	.0105	.....	0.	.04	
50,000	.0143	.....	0.	.04	
1,000	.....	—.0010	0.	0.	
60,000	.0183	.....	0.	.04	
70,000	.0220	.....	0.	.04	
80,000	.0255	.....	0.	.04	
90,000	.0297	.....	0.	.04	
100,000	.0335	.....	0.	.04	
1,000	.....	—.0006	0.	0.	
110,000	.0383	.....	0.	.04	
120,000	.0425	.....	—.01	.03	
130,000	.0468	.....	—.01	.02	
140,000	.0515	.....	—.01	.01	
150,000	.0565	.....	—.03	0.	
160,000	.0620	.....	—.06	—.01	
168,700	.....	.....	—.27	—.03	Ultimate strength—18,930 pounds per square inch.

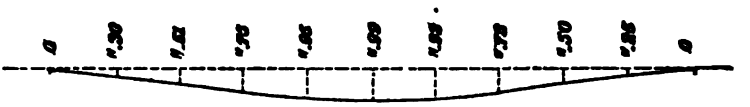
After passing the maximum load the bar deflected suddenly, increasing the horizontal deflection to—1″.50.

Loads released to initial load of 1,000 pounds; permanent horizontal deflection, —″.65.

Strains again applied and ordinates measured as below.

Curve of flexure.

[Ordinates every 12″.]



Scale disturbed on bar in front of 1⅛″ pins.

No. 759.

(Tested with two pin ends.)

Length, center to center, of 1⅛″ pins, 119″.58.
Gauged length, 100″.
Weight, 293 pounds.
Counter-weight at middle, 146 pounds.
Sectional area (2″.96 horizontal × 2″.99 vertical), 8.85 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0002	.....	0.	.02	
20,000	.0027	.....	0.	.03	
30,000	.0060	.....	0.	.03	
40,000	.0100	.....	0.	.04	
50,000	.0140	.....	0.	.04	
1,000	.....	—.0003	0.	0.	
60,000	.0180	.....	0.	.05	
70,000	.0212	.....	0.	.05	
80,000	.0250	.....	0.	.05	
90,000	.0287	.....	0.	.05	
100,000	.0325	.....	0.	.05	
1,000	.....	—.0006	0.	0.	
110,000	.0363	.....	0.	.05	
120,000	.0400	.....	0.	.05	
130,000	.0440	.....	.01	.06	
140,000	.0475	.....	.04	.06	
150,000	.0510	.....	.10	.07	
157,000	.....	.....	.33	.07	Ultimate strength = 17,740 pounds per square inch.

Post deflected suddenly after passing the maximum load; increasing the horizontal deflection to 1″.40.

No. 4398.

(Tested with two pin ends.)

Length, center to center, of $1\frac{7}{8}$″ pins, 119″.55.
Length over all, 119″.30.
Gauged length, 100″.
Weight, 293 pounds.
Counter-weight at middle, 146 pounds.
Sectional area (3″ horizontal × 2″.98 vertical), 8.94 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0019	.....	0.	.00½	
20,000	.0056	.....	0.	.01	
30,000	.0092	.....	0.	01	
40,000	.0130	.....	0.	01	
50,000	.0169	.....	0.	01	
1,000	.....	.0007	0.	0.	
60,000	.0206	.....	0.	.01	
70,000	.0242	.....	0.	01	
80,000	.0282	.....	0.	 01	
90,000	.0320	.....	0.	01	
100,000	.0361	.....	0.	01	
1,000	.....	.0009	0.	0.	
110,000	.0400	.....	0.	.01	
120,000	.0438	.....	0.	01	
130,000	.0475	.....	0.	.01½	
140,000	.0511	.....	0.	.....01½	
150,000	.0548	.....	0.	.....01½	
1,000	.....	.0010	0.	0.	
160,000	.0585	.....	0.	.02	
170,000	.0620	.....	—.00½	.03	
180,000	.0646	.....	—.02	.04	
185,000	.....	.....	—.05	.05	
190,000	.....	.....	—.10	.10	
192,020	.....	.....	—.18	.14	Ultimate strength = 21,480 pounds per square inch.
185,000	.....	.....	—.46	.14	Load and deflections taken as pressure gradually fell. Sudden springing occurred at this point.
72,000	.....	.....	—1.90	.16	Load and deflections after sudden springing of post.

Scale disturbed in front of pins.

No. 4399.

(Tested with two pin ends.)

Length, center to center, of $1\frac{7}{8}''$ pins, 119″.56.
Length over all, 119″.28.
Gauged length, 100″.
Weight, 293 pounds.
Counter-weight at middle, 146 pounds.
Sectional area (2″.98 horizontal × 2″.98 vertical), 8.88 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0023	.....	0.	.00½	
20,000	.0063	.....	0.	.00½	
30,000	.0102	.....	0.	.00½	
40,000	.0143	.....	0.	.00½	
50,000	.0180	.....	0.	.00½	
1,000	.....	0.	0.	0.	
60,000	.0219	.....	0.	.00½	
70,000	.0255	.....	0.	.00½	
80,000	.0297	.....	0.	.00½	
90,000	.0334	.....	0.	.00½	
100,000	.0377	.....	0.	.00½	
1,000	.....	.0006	0.	0.	
110,000	.0415	.....	0.	.00½	
120,000	.0454	.....	0.	0.	
130,000	.0495	.....	0.	0.	
140,000	.0537	.....	0.	0.	
150,000	.0580	.....	0.	0.	
1,000	.....	.0010	0.	0.	
160,000	.0630	.....	0.	—.00½	
170,000	.0680	.....	0.	—.01	
180,000	.0742	.....	.02	—.04	
185,000	.....	.....	.06	—.07	
190,000	.....	.....	.18	—.13	Ultimate strength = 21,400 pounds per square inch.
179,000	.....	.....	.50	—.15	At this point sudden springing occurred.
75,000	.....	.....	2.00	—.15	Load and deflections after sudden springing.

No. 4400.

(Tested with two pin ends.)

Length, center to center, of 2¼″ pins, 119″.75.
Length over all, 119″.50.
Gauged length, 100″.
Weight, 290½ pounds.
Counter-weight at middle, 146 pounds.
Sectional area (2″.98 horizontal × 2″.96 vertical), 8.82 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0021	.....	.00⅛	.01	
20,000	.0055	.....	.00⅜	.01	
30,000	.0090	.....	.00⅜	.02	
40,000	.0129	.....	.01	.02	
50,000	.0162	.....	.01	.03	
1,000	.....	—.0007	0.	.01	
60,000	.0199	.....	.00⅛	.03	
70,000	.0235	.....	.00⅜	.03	
80,000	.0274	.....	.00⅜	.03	
90,000	.0312	.....	.00⅜	.03	
100,000	.0350	.....	.00⅜	.03	
1,000	.....	—.0010	.00⅜	.01	
110,000	.0389	.....	.00⅜	.03⅛	
120,000	.0426	.....	.00⅜	.03⅛	
130,000	.0465	.....	.00⅜	.03⅛	
140,000	.0501	.....	.00⅜	.03⅛	
150,000	.0540	.....	.00⅜	.03⅛	
1,000	.....	—.0013	.00½	.01	
160,000	.0580	.....	.00⅜	.03⅛	
170,000	.0616	.....	.00⅜	.04	
180,000	.0655	.....	.02	.05	
185,000	.....	.....	.03	.05⅛	
190,000	.....	.....	.05	.07	
195,000	.....	.....	.10	.10	
195,900	.....	.....	.16	.13	Ultimate strength =22,210 pounds per square inch.
178,000	.....	.....	.60	.25	
Sudden deflection changing to—					
77,000	.....	.....	1.95	.20	

Scale disturbed in front of pins.

No. 4401.

(Tested with two pin ends.)

Length, center to center, of 2¼″ pins, 119″.75.
Length over all, 119″.47.
Gauged length, 100″.
Weight, 293 pounds.
Counter-weight at middle, 146 pounds.
Sectional area (2″.98 horizontal × 2″.99 vertical), 8.91 square inches.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
1,000	0.	.....	0.	0.	
10,000	.0009	.....	0.	.01	
20,000	.0044	.....	0.	.02	
30,000	.0081	.....	0.	.02	
40,000	.0120	.....	0.	.02	
50,000	.0160	.....	0.	.02	
1,000	.....	0.	0.	.00½	
60,000	.0195	.....	0.	.02	
70,000	.0233	.....	0.	.02	
80,000	.0271	.....	0.	.02½	
90,000	.0311	.....	0.	.02½	
100,000	.0350	.....	0.	.02½	
1,000	.....	0.	0.	.00½	
110,000	.0392	.....	0.	.02½	
120,000	.0430	.....	0.	.02½	
130,000	.0471	.....	0.	.02½	
140,000	.0511	.....	0.	.02½	
150,000	.0553	.....	0.	.02½	
1,000	.....	.0007	0.	0.	
160,000	.0596	.....	0.	.02	
170,000	.0642	.....	0.	.02	
180,000	.0690	.....	.01	.00½	
185,000	.....	.....	.01	0.	
190,000	.....	.....	.01	—.01½	
195,000	.....	.....	.03	—.03	
198,600	.....	.....	.10	—.10	Ultimate strength = 22,290 pounds per square inch.
176,000	.....	.....	.50	.20	Took sudden deflection.
69,000	.....	.....	2.10	—.23	Load and deflections after sudden springing.

Scale disturbed in front of pins.

3 b.

TABULATION OF COMPRESSION TESTS OF 3″ × 3″ WROUGHT-IRON BARS.

TESTED WITH TWO PIN ENDS.

Number of test.	Diameter of pins.	Dimensions of bar.			Sectional area.	Ultimate compressive strength.		Manner of failure.
		Length.	Breadth.	Depth.		Total.	Pounds per square inch.	
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Pounds.*		
4378	1¼	30.00	2.96	2.99	8.79	248,400	28,260	Horizontal deflection.
4379	1¼	30.00	2.99	2.98	8.91	285,000	31,990	Do.
4376	1¼	42.00	2.98	2.99	8.91	232,100	26,050	Do.
4377	1¼	42.00	2.98	2.97	8.85	267,900	30,270	Do.
4374	1¼	53.99	2.98	2.99	8.91	234,550	26,320	Do.
4375	1¼	54.00	2.97	2.99	8.88	237,200	26,710	Do.
4372	1¼	59.98	2.96	3.00	8.88	233,650	26,310	Do.
4373	1¼	59.98	2.98	2.99	8.91	237,400	26,640	Do.
4370	1¼	66.00	2.98	2.98	8.88	226,900	25,550	Do.
4371	1¼	66.00	2.97	2.98	8.85	224,000	25,310	Do.
4368	1¼	71.98	2.97	2.97	8.82	246,300	27,930	Do.
4369	1¼	71.98	2.97	2.98	8.85	235,050	26,560	Downward deflection.
4367	1¼	78.03	2.96	3.01	8.91	238,780	26,800	Horizontal deflection.
4365	1¼	84.00	2.97	2.96	8.79	226,560	25,770	Do.
4366	1¼	84.00	2.97	2.96	8.79	206,450	23,490	Do.
4364	1¼	90.00	3.01	2.95	8.88	213,350	24,030	Do.
4363	1¼	90.00	2.97	2.98	8.85	224,600	25,380	Do.
1628	1¼	93.54	2.95	2.95	8.70	225,000	25,860	Do.
1629	1¼	95.54	2.97	2.96	8.79	213,100	24,240	Do.
1626	1¼	101.69	2.98	2.99	8.91	220,000	24,690	Do.
1627	1¼	101.67	3.02	2.96	8.94	197,050	22,040	Do.
1624	1¼	107.57	2.98	2.99	8.91	194,900	21,870	Do.
1625	1¼	107.56	2.97	2.99	8.88	186,100	20,960	Do.
1622	1¼	113.63	2.98	2.98	8.88	175,300	19,740	Do.
1623	1¼	113.63	2.98	2.98	8.88	186,950	21,050	Do.
1620	1¼	119.60	2.98	2.98	8.88	183,500	20,660	Do.
1621	1¼	119.60	2.98	2.99	8.91	180,000	20,200	Do.
1618	1¼	125.63	2.98	2.99	8.91	156,600	17,580	Do.
1619	1¼	125.64	2.98	2.98	8.88	182,800	20,590	Do.
1616	1¼	131.70	3.00	2.96	8.88	185,000	20,830	Do.
1617	1¼	131.70	3.01	2.95	8.88	172,900	19,470	Do.
1614	1¼	137.65	2.98	2.97	8.85	154,150	17,420	Do.
1615	1¼	137.66	2.99	2.96	8.85	160,500	18,140	Do.
1612	1¼	143.82	2.96	2.98	8.82	154,300	17,490	Do.
1613	1¼	143.82	2.97	2.99	8.88	157,280	17,710	Do.
1610	1¼	149.79	2.99	2.98	8.91	147,180	16,520	Do.
1611	1¼	149.77	2.99	2.98	8.91	158,950	17,840	Do.
1608	1¼	155.76	2.95	2.95	8.70	160,000	18,390	Do.
1609	1¼	155.74	2.99	2.96	8.85	150,000	16,950	Do.
1606	1¼	161.81	2.98	2.98	8.88	147,300	16,590	Do.
1607	1¼	161.81	2.96	2.97	8.79	148,200	16,860	Do.
1604	1¼	167.76	2.96	3.00	8.88	141,050	15,880	Do.
1605	1¼	167.75	2.95	3.00	8.85	158,600	17,920	Do.
1602	1¼	173.60	2.98	2.98	8.88	124,950	14,070	Do.
1603	1¼	173.62	2.98	2.97	8.85	132,600	14,980	Do.
1600	1¼	179.50	2.94	2.99	8.79	114,350	13,010	Do.
1601	1¼	179.46	2.98	2.98	8.88	139,400	15,700	Do.

TESTED WITH TWO FLAT ENDS.

760	.....	89.56	2.98	2.99	8.91	238,600	26,780	Horizontal deflection.
761	.....	89.56	2.98	2.99	8.91	227,900	25,580	Do.
744	.....	119.38	2.99	2.98	8.91	205,000	23,010	Do.
745	.....	119.38	2.99	2.98	8.91	200,000	22,450	Horizontal and downward deflection.

TESTED WITH ONE FLAT AND ONE PIN END.

762	1¼	89.70	2.98	2.99	8.91	223,800	25,120	Horizontal deflection.
763	1¼	89.68	2.98	2.99	8.91	224,500	25,190	Do.
1598	1¼	119.48	2.99	2.98	8.91	200,000	22,450	Do.
1599	1¼	119.46	2.99	2.98	8.91	194,900	21,870	Do.

TABULATION OF COMPRESSION TESTS, &c.—Continued.

TESTED WITH TWO PIN ENDS.

Number of test.	Diameter of pins.	Diameter of bar.			Sectional area.	Ultimate compressive strength.		Manner of failure.
		Length.	Breadth.	Depth.		Total.	Pounds per square inch.	
	Inch.	*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Pounds.*		
742	1	119.68	2.99	2.98	8.91	144,800	16,250	Horizontal deflection.
743	1	119.71	2.98	2.99	8.91	145,400	16,320	Do.
758	1⅛	119.58	2.99	2.98	8.91	168,700	18,930	Do.
759	1⅛	119.58	2.96	2.99	8.85	157,000	17,740	Do.
1620	1½	119.60	2.98	2.98	8.88	183,500	20,660	Do.
1621	1½	119.60	2.98	2.99	8.91	180,000	20,200	Do.
4398	1⅞	119.55	3.00	2.98	8.94	192,020	21,480	Do.
4399	1⅞	119.56	2.98	2.98	8.88	190,000	21,400	Do.
4400	2¼	119.75	2.98	2.96	8.82	195,900	22,210	Do.
4401	2¼	119.75	2.98	2.99	8.91	198,600	22,290	Do.

4a.

COMPRESSION OF WROUGHT-IRON COLUMNS, LATTICED BOX AND SOLID WEB.

This series of tests comprises seventy-four columns; forty of the number have been tested, the results of which are herewith presented.

The columns were made by the Detroit Bridge and Iron Company.

The styles of posts represented are those composed of—

Channel bars with solid webs.

Channel bars and plates.

Plates and angles.

Channel bars, latticed with straight and swelled sides.

Channel bars, latticed on one side, and with continuous plate on one side.

All the posts were tested with 3½″ pins placed in the ceter of gravity of cross-section; except two posts of set N, which had the pins in the center of gravity of the channel bars. This gave an eccentric loading for these columns, on account of the continuous plate on one side of the channel bars.

The pins were used in a vertical position, unless otherwise stated in the details of the tests.

In the testing-machine the posts occupied a horizontal position.

They were counter-weighted at the middle.

Cast-iron bolsters for pin seats were used between the ends of the columns and the flat compression platforms of the testing-machine.

The sectional areas were obtained from the weights of the channel bars, angles, and plates, which were weighed before any holes were punched, calling the sectional area, in square inches, one-tenth the weight in pounds per yard of the iron.

Compressions and sets were measured within the gauged length by a screw micrometer.

The guaged length covered the middle portion of the post, and was taken along the center line of the upper channel bar or plate, always

using a length shorter than the distance between the eye-plates, to obtain gaugings unaffected by the concentration of load at those points.

The deflections were measured at the middle of the post. An arm carrying a pointer was clamped to the post. The pointer, moving over the face of a dial, indicated the amount and direction of deflection.

Loads were gradually applied, measuring the compressions and deflections after each increment; returning at intervals to the initial load to determine the sets.

The maximum load the column was capable of sustaining was recorded as the ultimate strength, although, previous to reaching this load, considerable distortion may have been produced.

Observations were made on the behavior of the posts after passing the maximum load, while the pressure was falling, showing in some cases a tendency to deflect with a sudden spring, accompanied by serious loss of strength.

The slips of the eye-plates along the continuous plates and channel bars during the tests were measured for certain posts in sets F, G, H, and I. The measurements of slip were taken in a length of 10″ or 20″, one end of the micrometer being secured to the eye-plate, and one end to the channel bar. The readings include both the compression movement of the material and the slip of the plates.

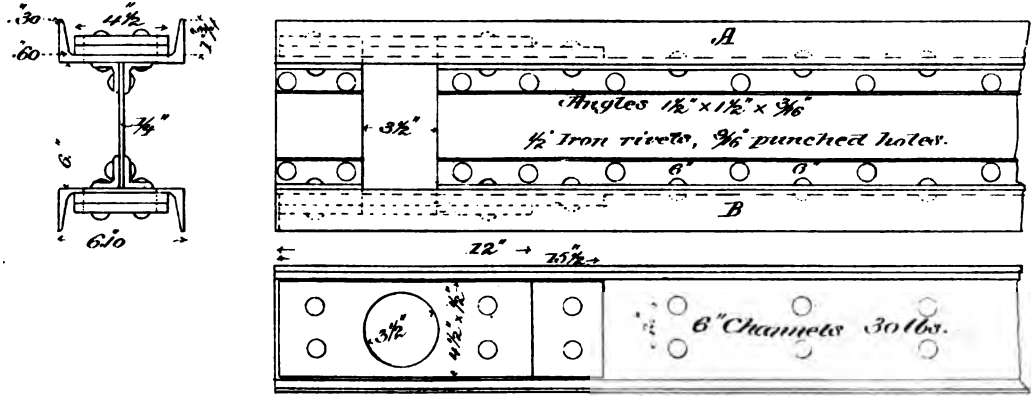
Columns H, I, L, and M were provided with pin holes for placing the pins either parallel or perpendicular to the webs of the channel bars.

After the ultimate strength had been determined with the pins in their first position, a supplementary test was made, if the condition of the column justified it with the pins at right angles to their former position; thus changing the moment of inertia of the cross-section, taken about the pin as an axis.

The experiments with columns N show how much strength is saved by employing the pins in the center of gravity of the cross-section. Where such was not the case, the columns showed the effect of the eccentric loading by deflections perpendicular to the axis of the pins, from the initial loads, which resulted in their early failure.

Set A

General dimensions



S. EX. 5 , 1, 48.

WROUGHT-IRON COLUMNS.

SET A.—6″ *channels with solid web.*

No. 752.

Length, center to center, of 3½ pins, 120″.20 = 10′ — 0.″20.
Gauged length, 80″.
Total weight, 432 pounds.
Counter-weight at middle, 216 pounds.

Sectional area.

	Square inches.
Channel A, 11′ 0″, 112 pounds	3.054
Channel B, 11′ 0″, 112 pounds	3.054
Web plate, 9′ 9″, 45 pounds; thickness, ″.25	1.385
Angles, each 9′ 9″, 19 pounds	2,338
Total	9.831

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0031	.....	0.	—.02	
20,000	.0089	.....	0.	—.06	
30,000	.0132	.....	0.	—.06	
40,000	.0182	.....	0.	—.07	
50,000	.0232	.....	0.	—.09	
5,000	.....	0.	0.	—.02	
60,000	.0280	.....	0.	—.10	
80,000	.0360	.....	0.	—.11	
100,000	.0425	.....	0.	—.12	
5,000	.....	0.	0.	—.04	
120,000	.0483	.....	0.	—.14	
140,000	.0540	.....	0.	—.16	
150,000	.0565	.....	0.	—.16	
5,000	.....	0.	0.	—.06	
160,000	.0590	.....	0.	—.17	
170,000	.0614	.....	0.	—.18	
180,000	.0640	.....	0.	—.18	
190,000	.0670	.....	0.	—.19	
200,000	.0697	.....	0.	—.19	
5,000	.....	.0018	0.	—.11	
210,000	.0721	.....	0.	—.20	
220,000	.0755	.....	+.01	—.20	
230,000	.0785	.....	.03	—.20	
240,000	.0820	.....	.03	—.21	
250,000	.0855	.....	.04	—.21	
260,000	.0900	.....	.05	—.21	
270,000	.0937	.....	.07	—.22	
280,000	.0976	.....	.09	—.23	
290,000	.1027	.....	.12	—.30	
297,100	.....	.....	.26	—.41	Ultimate strength = 30,220 pounds per square inch.

Failed by horizontal deflection. Loads continued till horizontal deflection reached 1″ vertical —″.10.
Pin holes not elongated.
Pins bent ″.23 concave in 12 inches.

No. 757.

Length, center to center, of 3½ pins, 120″.07 = 10′—0.″07.
Gauged length, 80″.
Total weight, 446 pounds.
Counter-weight at middle, 223 pounds.

Sectional area.

	Square inches.
Channel A, 11′ 0″, 110 pounds	2.997
Channel B, 11′ 0″, 131 pounds	3.571
Web plate, 9′ 9″, 44 pounds	1.354
Angles each, 9′ 9″, 18½ pounds	2.277
Total	10.199

Bent pins from experiment No. 755 used with this column, placed so that they shall be bent in an opposite direction. When driving pin in column a rivet head came off. Granular appearance.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0020	.....	0.	−.00½	
20,000	.0050	.....	0.	0.	
30,000	.0078	.....	0.	0.	
40,000	.0110	.....	0.	0.	
50,000	.0140	.....	0.	0.	
5,000	.....	.0004	0.	0.	
60,000	.0170	.....	0.	−.00½	
70,000	.0200	.....	0.	−.02	
80,000	.0230	.....	−.01	−.05	
90,000	.0261	.....	−.03	−.08	
100,000	.0297	.....	−.04	−.10	
5,000	.....	0.	0.	−.02	
110,000	.0325	.....	−.04	−.11	
120,000	.0359	.....	−.05	−.12	
130,000	.0398	.....	−.05	−.14	
140,000	.0430	.....	−.06	−.15	
150,000	.0460	.....	−.06	−.17	
5,000	.....	.0009	0.	−.08	
160,000	.0500	.....	−.05	−.18	
170,000	.0530	.....	−.06	−.20	
180,000	.0560	.....	−.06	−.20	
190,000	.0592	.....	−.07	−.21	
200,000	.0626	.....	−.08	−.23	
5,000	.....	.0027	0.	−.11	
210,000	.0660	.....	−.07	−.24	
220,000	.0690	.....	−.08	−.25	
230,000	.0725	.....	−.09	−.27	
240,000	.0760	.....	−.09	−.29	
250,000	.0800	.....	−.10	−.30	
5,000	.....	.0060	−.01	−.16	
260,000	.0835	.....	−.10	−.32	
270,000	.0879	.....	−.10	−.34	
280,000	.0928	.....	−.11	−.36	
290,000	.0980	.....	−.13	−.39	
300,000	.....	.....	−.16	−.43	
310,000	.....	.....	−.20	−.47	
320,000	.....	.....	−.28	−.54	Ultimate strength = 31,380 pounds per square inch.

Sustained maximum load, 320,000 pounds, 5 minutes, gradually bending the pins, and failing at eye-plates by shearing rivets between eye-plates and channel webs, 3½″ wrought-iron pins bent ″.37 concave in 12″.

No. 755.

Length, center to center, of 3½″ pins, 180″.=15′—0″.
Gauged length, 150″.
Total weight, 598 pounds.
Counter-weight at middle, 299 pounds.

Sectional area.

	Square inches.
Channel A, 16′ 0″, 163 pounds	3.056
Channel B, 16′ 0″, 163 pounds	3.056
Web-plate, 14′ 9″, 66 pounds	1.343
Angles each, 14′ 9″, 31 pounds	2.522
	9.977

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0010	.....	0.	0.	
20,000	.0050	.....	0.	.01	
30,000	.0090	.....	0.	.02	
40,000	.0120	.....	0.	.03	
50,000	.0160	.....	0.	.04	
5,000	.....	−.0008	0.	−.01	
60,000	.0205	.....	0.	.04	
70,000	.0250	.....	0.	.05	
80,000	.0307	.....	0.	.05	
90,000	.0360	.....	0.	.05	
100,000	.0415	.....	0.	.06	
5,000	.....	−.0010	0.+	−.02	
110,000	.0470	.....	0.	.07	
120,000	.0528	.....	0.	.08	
130,000	.0583	.....	0.	.09	
140,000	.0641	.....	.01	.09	
150,000	.0700	.....	.01	.10	
5,000	.....	−.0004	.01	−.02	
160,000	.0768	.....	.01	.09	
170,000	.0829	.....	.01	.10	
180,000	.0895	.....	0.	.10	
190,000	.0962	.....	0.	.11	
200,000	.1028	.....	0.	.12	
5,000	.....	.0015	.01	−.02	
210,000	.1101	.....	−.02	.11	
220,000	.1170	.....	−.05	.12	
230,000	.1251	.....	−.10	.13	
235,000	.1290	.....	−.12	.15	
5,000	.....	.0050	0.	.01	
240,000	.1340	.....	−.15	.15	
245,000	.1389	.....	−.22	.18	
250,000	.1431	.....	−.30	.21	
5,000	.....	.0095	−.06	.07	
250,000	.....	.....	−.34	.22	
251,000	.....	.....	−1.00*	−.30*	Ultimate strength = 25,160 pounds per square inch.

*About.

Failed by horizontal deflection.
Pins bent concave ″.08 in 12″.

No. 756.

Length, center to center, of 3½″ pins, 180″.=15′—0″.
Gauged length, 150″.
Total weight, 592 pounds.
Counter-weight at middle, 296 pounds.

Sectional area.

	Square inches.
Channel A, 16′ 0″, 163 pounds	3.056
Channel B, 16′ 0″, 163 pounds	3.056
Web-plate, 14′ 9″, 66 pounds	1.343
Angles each, 14′ 9″, 31 pounds	2.522
	9.977

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0009	.....	0.	.01	
20,000	.0018	.....	0.	.06	
30,000	.0053	.....	0.	.08	
40,000	.0093	.....	0. +	.09	
50,000	.0145	.....	−.01	.09	
5,000	.....	.0005	0.	0.	
60,000	.0208	.....	−.03	.06	
70,000	.0260	.....	−.05	.06	
80,000	.0316	.....	−.06	.06	
90,000	.0371	.....	−.07	.05	
100,000	.0428	.....	−.08	.04	
5,000	.....	.0010	0.	−.02	
110,000	.0481	.....	−.09	.01	
120,000	.0539	.....	−.10	.01	
130,000	.0595	.....	−.11	0.	
140,000	.0650	.....	−.12	0.	
150,000	.0708	.....	−.14	0.	
5,000	.....	.0015	−.01	−.04	
160,000	.0770	.....	−.17	−.03	
170,000	.0830	.....	−.20	−.03	
180,000	.0890	.....	−.22	−.03	
190,000	.0950	.....	−.26	−.02	
200,000	.1022	.....	−.34	0.	
5,000	.....	.0040	−.08	−.01	
200,000	.1031	.....	−.39	0.	
210,000	.1100	.....	−.54	.07	Ultimate strength = 21,050 pounds per square inch.

Steel pins (quality unknown) bent concave about ″.02 in 12″.
Pin holes in channels and eye-plates not elongated.
Rivet heads cut off at eye-plates and rivets driven out. They were tight under the heads, but did not fill well at the bodies.
With eye-plates more securely riveted (slipping along channel-bars being prevented), the pins would have had less opportunity to bend.

No. 753.

Length, center to center, of 3½″ pins, 240″ = .20′ — 0″.
Gauged length, 200″.
Total weight, 765 pounds.
Counter-weight at middle, 382 pounds.

Sectional area.

	Square inches.
Channel A, 21′ 0″, 215 pounds	3.071
Channel B, 21′ 0″, 212 pounds	3.029
Web plate, 19′ 9″, 79 pounds	1.200
Angles each, 19′ 9″, 40 pounds	2.432
	9.732

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0030	.....	.01	.01	
20,000	.0085	.....	.01	.04	
30,000	.0150	.....	.01	.04	
40,000	.0220	.....	.01	.05	
50,000	.0290	.....	.01	.06	
5,000	.....	0.	.01	0.	
60,000	.0356	.....	0.	.07	
70,000	.0430	.....	0.	.09	
80,000	.0500	.....	0.	.10	
90,000	.0575	.....	+.01	.10	
100,000	.0656	.....	.02	.11	
5,000	.....	0.	—.01	0. +	
110,000	.0721	.....	.03	.12	
120,000	.0800	.....	.05	.12	
130,000	.0874	.....	.06	.13	
140,000	.0950	.....	.09	.13	
150,000	.1030	.....	.11	.13	
5,000	.....	.0008	—.01	.01	
160,000	.1105	.....	.13	.13	
170,000	.1190	.....	.19	.13	
180,000	.1270	.....	.32	.10	
5,000	.....	.0024	.0	0.	
188,600	.....	.....	.55	0.	Ultimate strength=19,380 pounds per square inch.

Deflected horizontally.

When deflection reached 1″ the column sprung suddenly, increasing deflection to 2″.10. Load released to 5,000 pounds; horizontal deflection ″.34, vertical ″.31.

Pins bent about ″.03 concave in 12″.

No. 754.

Length, center to center, of $3\frac{1}{2}$ pins, $240''.10 = 20' - 0''.10$.
Gauged length, $200''$.
Total weight, 755 pounds.
Counter-weight at middle, 378 pounds.

Sectional area.

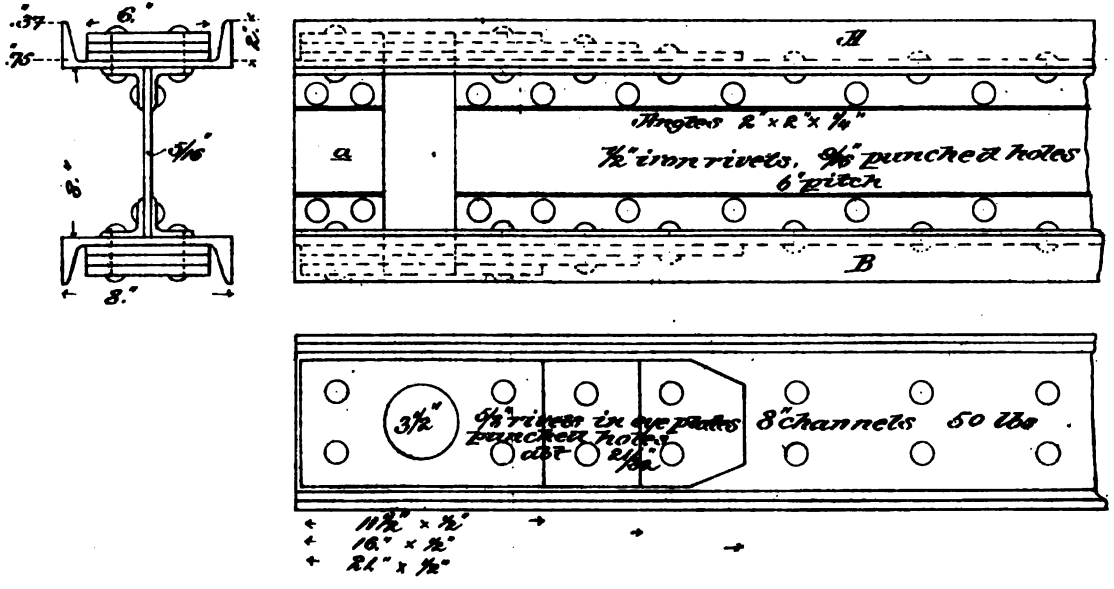
	Square inches.
Channel A, 21′ 0″, 215 pounds	3.071
Channel B, 21′ 0″, 211 pounds	3.014
Web plate, 19′ 9″, 78 pounds	1.185
Angles each, 19′ 9″, 41 pounds	2.492
	9.762

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0040	.....	0.	—.02	
20,000	.0112	.....	—.01	—.04	
30,000	.0186	.....	—.01	—.04	
40,000	.0252	.....	—.02	—.02	
50,000	.0324	.....	—.05	—.01	
5,000	.....	.0005	0.	—.06	
60,000	.0400	.....	—.07	—.01	
70,000	.0470	.....	—.09	0.	
80,000	.0542	.....	—.10	.01	
90,000	.0612	.....	—.12	.08	
100,000	.0680	.....	—.16	.05	
5,000	.....	0.	0.	—.06	
110,000	.0757	.....	—.17	.05	
120,000	.0830	.....	—.21	.07	
130,000	.0910	.....	—.28	.09	
140,000	.0990	.....	—.38	.10	
150,000	.1070	.....	—.56	.11	
5,000	.....	.0008	—.02	—.08	
150,000	.....	.....	—.46	.11	
158,300	.....	.....	—1.00	.10	Ultimate strength = 16,220 pounds per square inch.

Deflections increased to $-4''$ horizontal.
Load released to initial 5,000 pounds; deflections reading horizontal $-2''.10$, vertical $-''.08$.

Set D

General dimensions



S. EX. 5, 1, 48.

WROUGHT-IRON COLUMNS.

SET D.—8″ *channels with solid webs.*

No. 751.

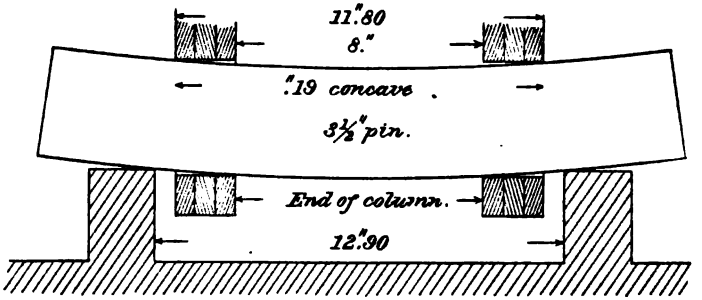
Length, center to center, of 3½″ pins, 240″ = 20′ —0″.
Gauged length, 200″.
Total weight, 1,275 pounds.
Counter-weight at middle, 637 pounds.

Sectional area.

	Square inches
Channel A, 21′ 0″, 345 pounds; web, ″.35	4.929
Channel B, 21′ 0″, 349 pounds; web, ″.35	4.986
Web plate, 19′ 9″, 165 pounds; thickness, $\frac{5}{16}$″	2.506
Four angles, 21′ 0″, 64 pounds each (2″ × 2″ × ¼″)	3.656
	16.077

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0033	.....	0.	0.	
20,000	.0100	.....	0.	—.02	
30,000	.0158	.....	0.	—.04	
40,000	.0212	.....	—.01	—.05	
50,000	.0265	.....	—.01	—.06	
5,000	.....	0.	0.	—.01	
60,000	.0306	.....	—.01	—.06	
80,000	.0390	.....	—.02	—.06	
100,000	.0480	.....	—.02	—.06	
5,000	.....	0.	—.01	—.01	
120,000	.0565	.....	—.03	—.07	
140,000	.0652	.....	—.03	—.07	
150,000	.0695	.....	—.03	—.07	
5,000	.....	—.0005	—.01	—.02	
160,000	.0740	.....	—.04	—.09	
170,000	.0782	.....	—.05	—.09	
180,000	.0824	.....	—.05	—.09	
190,000	.0872	.....	—.05	—.10	Snapping sounds.
200,000	.0910	.....	—.05	—.10	
5,000	.....	0.	—.01	—.05	
210,000	.0955	.....	—.06	—.14	
220,000	.0998	.....	—.06	—.16	
230,000	.1034	.....	—.07	—.17	
240,000	.1070	.....	—.07	—.17	
250,000	.1106	.....	—.07	—.19	
5,000	.....	0.	—.01	—.11	
260,000	.1140	.....	—.10	—.26	
270,000	.1188	.....	—.11	—.29	
280,000	.....	.....	—.12	—.30	
290,000	.....	.....	—.12	—.32	
300,000	.....	.....	—.14	—.35	
310,000	.....	.....	—.16	—.38	
320,000	.....	.....	—.17	—.40	= 19,900 pounds per square inch.

Test discontinued on account of bending of 3½″ pins.



The apparent deflections of the column were in part caused by the bending of the pins, which moved the post as a whole in the testing machine.

Post rested 13 days, then tested, using steel pins (web *a* behind pins removed), and bolsters for pins, having inside bearings between the channel bars.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	.....	.....	0.	0.	
50,000	.....	.....	0.	—.03	
100,000	.....	.....	—.01	—.06	
150,000	.....	.....	—.02	—.08	
200,000	.....	.....	—.04	—.09	
250,000	.....	.....	—.06	—.10	
300,000	.....	.....	—.09	—.14	
320,000	.....	.....	—.10	—.15	
340,000	.....	.....	—.11	—.17	
360,000	.....	.....	—.12	—.18	
370,000	.....	.....	—.14	—.20	
380,000	.....	.....	—.16	—.22	
390,000	.....	.....	—.18	—.24	
400,000	.....	.....	—.21	—.27	
410,000	.....	.....	—.28	—.30	
415,000	.....	.....	—.33	—.35	
420,000	.....	.....	—.41	—.40	
425,000	.....	.....	—.51	—.46	Ultimate strength = 26,430 pounds per square inch.
Strains continued, the load gradually falling as the deflections increased.					
*400,000	.....	.....	—1.20	—.55	Sprung suddenly.
278,000	.....	.....	—2.68	—.50	Load and deflections after sudden springing.
5,000	.....	.....	—1.15	—.28	
278,500	.....	.....	—2.86	—.48	Load sustained after above deflections.

* Approximate.

No. 1642.

Length, center to center, of 3½″ pins, 240″. = 20′ 0″.
Gauged length, 200″.
Weight, 1,290 pounds.
Counter-weight at middle, 645 pounds.

Sectional area.

	Square inches.
Channel A, 21′ 0″, 322 pounds; web ″.32	4.600
Channel B, 21′ 0″, 382 pounds; web ″.40	5.457
Web plate, 19′ 9″, 169 pounds; thickness ″.32	2.567
Angles each, 21′ 0″, 64 pounds	3.657
	16.281

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0013	.....	0.	0.	
30,000	.0020	.....	0.	0.	
40,000	.0050	.....	0.	0.	
50,000	.0088	.....	0.	0.	
60,000	.0130	.....	0.	0.	
70,000	.0170	.....	0.	.00½	
80,000	.0216	.....	0.	.00½	
90,000	.0256	.....	—.00½	.01	
100,000	.0300	.....	—.01	.01	
10,000	.....	—.0008	0.	—.05	
110,000	.0341	.....	—.02	.01	
120,000	.0382	.....	—.02	.02	
130,000	.0428	.....	—.02	.02	
140,000	.0470	.....	—.03	.02	
150,000	.0516	.....	—.04	.02	
160,000	.0560	.....	—.05	.02	
170,000	.0600	.....	—.05	.01	
180,000	.0650	.....	—.06	.01	
190,000	.0692	.....	—.06	0.	
200,000	.0737	.....	—.07	0.	
10,000	.....	0.	0.	—.06	
210,000	.0784	.....	—.07	0.	
220,000	.0826	.....	—.07	0.	
230,000	.0870	.....	—.08	0.	
240,000	.0916	.....	—.09	0.	
250,000	.0964	.....	—.09	0.	
260,000	.1010	.....	—.10	0.	
270,000	.1058	.....	—.11	—.00½	
280,000	.1100	.....	—.11	—.00½	
290,000	.1150	.....	—.12	—.00½	
300,000	.1195	.....	—.13	—.00½	
10,000	.....	.0020	0.	—.07	
310,000	.1245	.....	—.15	—.00½	
320,000	.1290	.....	—.16	—.01	
330,000	.1340	.....	—.18	—.01	
340,000	.1390	.....	—.20	0.	
350,000	.1440	.....	—.23	.04	
360,000	.1500	.....	—.28	.10	
367,000	.....	.....	—.40	.25	Ultimate strength = 22,540 pounds per square inch.
Loads continued after passing the maximum, the post rapidly yielding, but without sudden springing.					
235,000	.....	.....	—3.50	.63	Load sustained with deflections here shown.
10,000	.....	.....	—1.60	.60	Permanent deflections.

No. 1646.

Length, center to center, of 3½″ pins, 320″ = 26′ 8″.
Gauged length, 260″.
Weight, 1,660 pounds.
Counter-weight at middle, 830 pounds.

Sectional area.

	Square inches.
Channel A, 27′ 8″, 427 pounds; web ″.30	4.631
Channel B, 27′ 8″, 494 pounds; web ″.41	5.401
Web plate, 26′ 4″, 212 pounds; thickness, ″.30	2.415
Angles each, 27′ 8″ { 87 pounds, 86 pounds, 84 pounds, 87 pounds }	3.732
	16.179

Loads applied.	Compression.	Compression sets.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0034	.....	0.	.02	
30,000	.0068	.....	0.	.05	
40,000	.0104	.....	0.	.08	
50,000	.0145	.....	0.	.09	
60,000	.0195	.....	0.	.09	
70,000	.0245	.....	0.	.09	
80,000	.0298	.....	—.00½	.10	
90,000	.0348	.....	—.00½	.10	
100,000	.0400	.....	—.01	.11	
10,000	.....	0.	0.	.02	
110,000	.0457	.....	—.02	.12	
120,000	.0516	.....	—.02	.13	
130,000	.0571	.....	—.03	.13	
140,000	.0628	.....	—.03	.13	
150,000	.0690	.....	—.04	.13	
160,000	.0748	.....	—.04	.13	
170,000	.0804	.....	—.05	.13	
180,000	.0865	.....	—.06	.12	
190,000	.0922	.....	—.07	.11	
200,000	.0984	.....	—.08	.10	
10,000	.....	0.	+.00½	.02	
210,000	.1044	.....	—.07	.11	
220,000	.1100	.....	—.08	.11	
230,000	.1165	.....	—.09	.11	
240,000	.1224	.....	—.10	.10	
250,000	.1282	.....	—.11	.10	
260,000	.1344	.....	—.12	.10	
270,000	.1410	.....	—.14	.10	
280,000	.1470	.....	—.15	.10	
290,000	.1530	.....	—.16	.10	
300,000	.1591	.....	—.18	.11	
10,000	.....	.0022	+.00½	.02	
310,000	.1660	.....	—.32	.11	
315,000	.....	.....	—.40	.13	
318,800	.....	.....	—.52	.15	Ultimate strength = 19,700 pounds per square inch.
.....	.....	.....	—.70	.....	Sprung suddenly when this deflection was reached.
208,000	.....	.....	—3.27	.70	Load and deflections after sudden springing.
10,000	.....	.....	—.70	.25	
209,500	.....	.....	—3.30	.72	Maximum load sustained after above springing.
10,000	.....	.....	—.77	.28	Rested one hour.
208,000	.....	.....	.....	.....	Load sustained after resting.

No. 1647.

Length, center to center, of 3½″ pins, 320″.10 = 26′ 8″.10.
Gauged length, 260″.
Weight, 1,645 pounds.
Counter-weight at middle, 820 pounds.

Sectional area.

	Square inches.
Channel A, 27′ 8″, 493 pounds; web ″.40	5.347
Channel B, 27′ 8″, 427 pounds; web ″.34	4.631
Web plate, 26′ 5″, 213 pounds; thickness, ″.30	2.420
Angles each, 27′ 8″ { 87 pounds; 85 pounds; 86 pounds; 87 pounds }	3.743
	16.141

Loads applied.	Compression.	Compression sets.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0030	.....	0.	.03	
30,000	.0070	.....	0.	.05	
40,000	.0120	.....	0.	.06	
50,000	.0176	.....	0.	.07	
60,000	.0228	.....	0.	.08	
70,000	.0280	.....	— .00½	.09	
80,000	.0340	.....	.00½	.10	
90,000	.0390	.....	.00½	.11	
100,000	.0445	.....	— .01	.11	
10,000	.....	.0008	0.	0.	
110,000	.0500	.....	— .02	.12	
120,000	.0555	.....	— .04	.12	
130,000	.0610	.....	— .04	.13	
140,000	.0668	.....	— .05	.13	
150,000	.0723	.....	— .06	.13	
160,000	.0780	.....	— .07	.14	
170,000	.0835	.....	— .09	.14	
180,000	.0894	.....	— .09	.15	
190,000	.0950	.....	— .10	.15	
200,000	.1006	.....	— .11	.15	
10,000	.....	.0010	0.	0.	
210,000	.1066	.....	— .13	.15	
220,000	.1123	.....	— .15	.15	
230,000	.1180	.....	— .17	.16	
240,000	.1239	.....	— .19	.17	
250,000	.1296	.....	— .20	.17	
260,000	.1355	.....	— .23	.18	
270,000	.1415	.....	— .28	.18	
280,000	.1475	.....	— .33	.20	
283,000	.....	.....	— .50	.20	Ultimate strength = 17,570 pounds per square inch.
Failed by horizontal deflection, moving over rapidly but without sudden springing.					
200,000	.....	.....	—2.78	.37	Load and deflections, after rapid yielding.
10,000	.....	.....	— .55	.08	

Length, ce
Gauged le
Weight,
Counter

WROUGHT-IRON COLUMNS.

SET E.—2" channels with ¼" continuous plates.

No. 1653.

(Tested with pins horizontal.)

Channel
Channe
Web pl

Length, center to center, of 3½" pins, 320" = 26' 8".
Gauged length, 260".
Weight, 1,794 pounds.
Counter-weight at middle, 895 pounds.

Angl

Sectional area.

	Square inches.
Channel A, 27' 5", 461 pounds; web ".34	5.044
Channel B, 27' 4", 465 pounds; web ".35	5.104
Upper plate C, 27' 4", 353 pounds, approximate (12".6 × ".32)	3.875
Under plate D, 27' 4", 353 pounds, approximate (12".7 × ".30)	3.875
	17.898

[Compressions measured on plate C.]

Loads applied.	Compression.	Compression sets.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0050	.....	.04	0.	
40,000	.0158	.....	.07	0.	
60,000	.0259	.....	.08	0.	
80,000	.0362	.....	.09	0.	
100,000	.0470	.....	.09	0.	
10,000	.....	0.	0.	0.	
120,000	.0576	.....	.10	.01	
140,000	.0680	.....	.10	.01	
160,000	.0779	.....	.10	.01	
180,000	.0885	.....	.10	.01	
200,000	.0990	.....	.11	.02	
10,000	.....	0.	0.	0.	
220,000	.1100	.....	.11	.02	
240,000	.1200	.....	.12	.02	
260,000	.1304	.....	.12	.02	
280,000	.1408	.....	.12	.03	
300,000	.1507	.....	.13	.04	
10,000	.....	0.	0.	0.	
320,000	.1612	.....	.13	.04	
340,000	.1713	.....	.14	.05	
360,000	.1810	.....	.14	.06	
380,000	.1909	.....	.15	.08	
400,000	.2000	.....	.17	.12	
10,000	.....	.0010	.01	.00½	
420,000	.2090	.....	.18	.14	
440,000	.2170	.....	.20	.20	
460,000	.2236	.....	.28	.31	
10,000	.....	.0025	.09	.08	
470,000	.....	.....	.32	.40	
.....	.....	.....	.38	.52	After five minutes' rest.
472,000	.....	.....	.40	.58	
473,000	.....	.....	.42	.71	
474,000	.....	.....	.45	.85	Ultimate strength = 26,480 pounds per square inch.
.....	.....	.....	.48	2.20	Maximum deflections; began to buckle continuous plate on concave side.
10,000	.....	.....	.30	.84	
362,000	.....	.....	.48	2.26	Maximum load sustained after above permanent deflections.

Failed by deflecting upward, perpendicular to the plane of the pins.

Snapping sounds heard frequently throughout the test; appare ming from the ends at eye plates.

WROUGHT-IRON COLUMNS.

SET E.—8″ *channels with* $\frac{5}{16}$″ *continuous plates.*

No. 1653.

(Tested with pins horizontal.)

Length, center to center, of 3½″ pins, 320″ = 26′ 8″.
Gauged length, 260″.
Weight, 1,794 pounds.
Counter-weight at middle, 895 pounds.

Sectional area.

	Square inches.
Channel A, 27′ 5″, 461 pounds; web ″.34	5.044
Channel B, 27′ 4″, 465 pounds; web ″.35	5.101
Upper plate C, 27′ 4″, 353 pounds, approximate (12″.6 × ″.32)	3.875
Under plate D, 27′ 4″, 353 pounds, approximate (12″.7 × ″.30)	3.875
	17.895

[Compressions measured on plate C.]

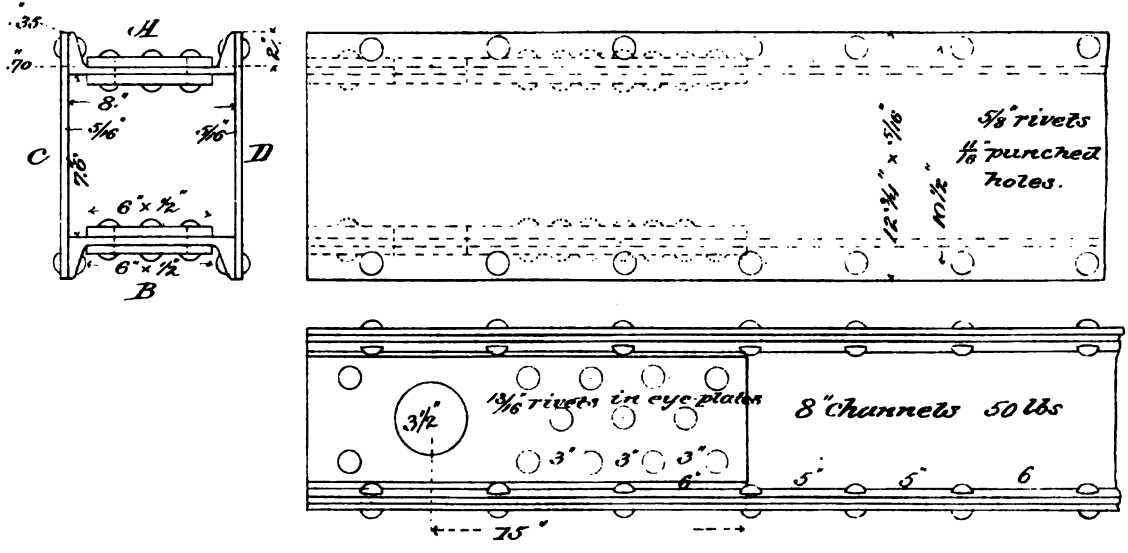
Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0050	.....	.04	0.	
40,000	.0158	.....	.07	0.	
60,000	.0259	.....	.08	0.	
80,000	.0362	.....	.09	0.	
100,000	.0470	.....	.09	0.	
10,000	.....	0.	0.	0.	
120,000	.0576	.....	.10	.01	
140,000	.0680	.....	.10	.01	
160,000	.0779	.....	.10	.01	
180,000	.0885	.....	.10	.01	
200,000	.0990	.....	.11	.02	
10,000	.....	0.	0.	0.	
220,000	.1100	.....	.11	.02	
240,000	.1200	.....	.12	.02	
260,000	.1304	.....	.12	.02	
280,000	.1408	.....	.12	.03	
300,000	.1507	.....	.13	.04	
10,000	.....	0.	0.	0.	
320,000	.1612	.....	.13	.04	
340,000	.1713	.....	.14	.05	
360,000	.1810	.....	.14	.06	
380,000	.1909	.....	.15	.08	
400,000	.2000	.....	.17	.12	
10,000	.....	.0010	.01	.00½	
420,000	.2090	.....	.18	.14	
440,000	.2170	.....	.20	.20	
460,000	.2236	.....	.28	.31	
10,000	.....	.0025	.09	.08	
470,000	.....	.....	.32	.40	
.....	.....	.....	.38	.52	After five minutes' rest.
472,000	.....	.....	.40	.58	
473,000	.....	.....	.42	.71	
474,000	.....	.....	.45	.85	Ultimate strength = 26,480 pounds per square inch.
.....	.....	.....	.48	2.20	Maximum deflections; began to buckle continuous plate on concave side.
10,000	.....	.....	.30	.84	
362,000	.....	.....	.48	2.26	Maximum load sustained after above permanent deflections.

Failed by deflecting upward, perpendicular to the plane of the 3 pins.

Snapping sounds heard frequently throughout the test; apparent coming from the ends at eye plates.

Set E

General dimensions



S. EX. 5 . 1. 48.

No. 1654.

(Tested with pins horizontal.)

Length, center to center, of 3½″ pins, 320″ = 26′ 8″.
Gauged length, 260″.
Weight, 1,940 pounds.
Counter-weight at middle, 970 pounds.

Sectional area.

	Square inches.
Channel A, 27′ 4″, 495 pounds; web ″.40	5.433
Channel B, 27′ 4″, 495 pounds; web ″.39	5.434
Plate C, 27′ 4″, 370 pounds, approximate (12″.68 × ″.31)	4.061
Plate D, 27′ 4″, 409 pounds, approximate (12″.75 × ″.36)	4.489
	19.417

[Compressions measured on plate C.]

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0050	.....	—.02	.01	
40,000	.0150	.....	—.04	.01	
60,000	.0255	.....	—.05	.01	
80,000	.0359	.....	—.06	0.	
100,000	.0460	.....	—.02	0.	
10,000	.....	—.0002	0.	—.00½	
120,000	.0555	.....	—.07	—.00½	
140,000	.0660	.....	—.07	—.01	
160,000	.0764	.....	—.08	—.02	
180,000	.0865	.....	—.08	—.03	
200,000	.0970	.....	—.08	—.04	
10,000	.....	—.0009	0.	—.00½	
220,000	.1070	.....	—.07	—.05	
240,000	.1172	.....	—.07	—.06	
260,000	.1282	.....	—.07	—.07	
280,000	.1390	.....	—.06	—.09	
300,000	.1500	.....	—.05	—.10	
10,000	.....	.0010	0.	—.00½	
320,000	.1600	.....	—.05	—.12	
340,000	.1712	.....	—.04	—.13	
360,000	.1835	.....	—.03	—.16	
380,000	.1965	.....	—.01	—.19	
400,000	.2108	.....	0.	—.24	
10,000	.....	.0021	+.00½	—.00½	
420,000	.2230	.....	.02	—.26	
440,000	.2415	.....	.07	—.33	
450,000	.2500	.....	.09	—.37	
10,000	.....	.0075	.05	—.01	
460,000	.....	.....	.11	—.40	
470,000	.....	.....	.12	—.46	
480,000	.....	.....	.12	—.55	
490,000	.....	.....	.13	—.70	
491,000	.....	.....	.15	—.84	Ultimate strength = 25,290 pounds per square inch.
Sustained load 5 minutes; pressure falling and deflections slowly increasing to—					
490,000	.....	.....	.18	—1.20	
Post then deflected rapidly, increasing deflections and pressure falling to—					
410,000	.....	.....	.18	—2.50	
Load released to initial strain.					
10,000	.....	.....	.10	—.98	

WROUGHT-IRON COLUMNS.

SET F.—$\frac{5}{16}$″ *continuous plates and angles.*

No. 1645.

Length, center to center, of 3½″ pins, 319″.95 = 26′ 7″.95.
Gauged length, 260″.
Weight, 1,765 pounds.
Counter-weight at middle, 880 pounds.

Sectional area.

	Square inches.
Upper $\frac{5}{16}$″ plate A, 27′ 4″, 352 pounds	3.864
Under $\frac{5}{16}$″ plate B, 27′ 4″, 374 pounds	4.105
Side $\frac{5}{16}$″ plate C, 27′ 4″, 206 pounds	2.261
Side $\frac{5}{16}$″ plate D, 27′ 4″, 205 pounds	2.250
Four angles each, 27′ 4″, 84 pounds	3.688
	16.168

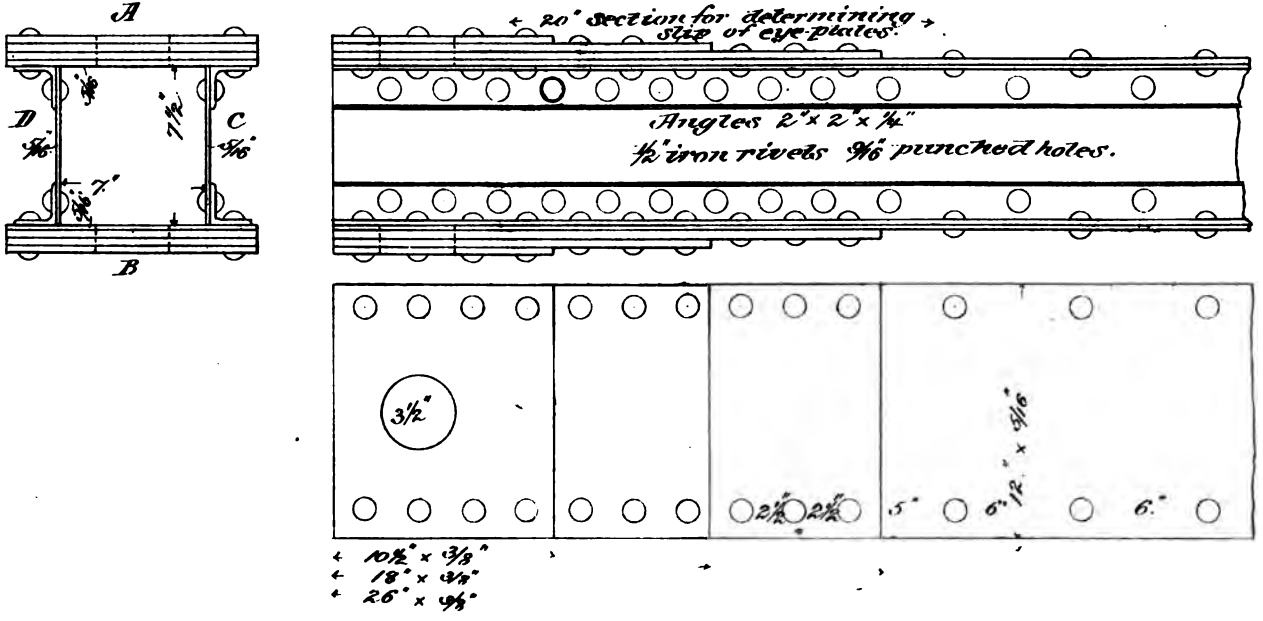
Width of plates A and B, 12″.10.
Width of plates C and D, 7″.35.

Loads applied.	Compression.	Compression sets.	Deflections. Horizontal.	Deflections. Vertical.	Slip of eye-plates in 20-inch section.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0056	.....	0.	—.00½	.0007	
30,000	.0116	.....	0.	—.01	.0014	
40,000	.0180	.....	0.	—.01	.0020	
50,000	.0234	.....	0.	—.01	.0025	
60,000	.0290	.....	0.	—.01	.0032	
80,000	.0410	.....	0.	—.01	.0041	
100,000	.0525	.....	0.	—.01	.0053	
10,000	.....	.0010	0.	—.02	.0004	
120,000	.0643	.....	0.	—.01	.0066	
140,000	.0756	.....	0.	—.01	.0080	
160,000	.0870	.....	0.	—.01	.0100	
180,000	.0990	.....	0.	—.01	.0116	
200,000	.1100	.....	0.	—.01	.0150	
10,000	.....	.0010	0.	—.02	.0050	
220,000	.1219	.....	0.	—.00½	.0179	
240,000	.1333	.....	0.	—.00½	.0204	
260,000	.1455	.....	0.	0.	.0241	
280,000	.1574	.....	0.	0.	.0292	
300,000	.1683	.....	0.	+.01	.0340	
10,000	.....	.0020	0.	—.01	.0192	
320,000	.1790	.....	0.	+.04	.0410	
340,000	.1900	.....	0.	.06	.0540	
10,000	.....	.0021	0.	0.	.0339	
Rested under zero load 60 hours.						
10,000	.....	.0021	0.	0.	.0339	Gauges set at same readings as when test was discontinued.
340,000	.1842	.....	0.	.12	.0564	
350,000	.1900	.....	0.	.13	.0572	
360,000	.1958	.....	0.	.13	.0588	
370,000	.2011	.....	0.	.14	.0602	
380,000	.2068	.....	0.	.15	.0628	
390,000	.2140	.....	0.	.16	.0688	
400,000	.2180	.....	0.	.19	.0760	
10,000	.....	.0027	0.	.05	.0520	
410,000	.2225	.....	0.	.22	.0962	
420,000	.2290	.....	0.	.25	.0960	
430,000	.2340	.....	0.	.30	.1020	
440,000	.2395	.....	0.	.34	.1135	
450,000	.2390	.....	0.	.55	.1290	
453,000	.....	.....	.03 .12	.64 1.15	.....	Ultimate strength =28,020 pounds per square inch.

Side plates buckled between rivets at middle of column when vertical deflection reached 1″.90.

Set F

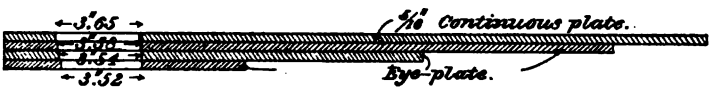
General dimensions



S. EX. 5, 1, 48.

The load at the time began to fall rapidly, eye-plates on convex side yielding by slipping.

Sketch showing section through pin hole after the test. Convex side of column.



No. 1650.

Length, center to center, of 3½″ pins, 320″ = 26′ 8″.
Gauged length, 260″.
Weight, 1,793 pounds.
Counter-weight at middle, 880 pounds.

Sectional area.

	Square inches.
Upper plate A, 27′ 4″, 368 pounds	4.040
Under plate B, 27′ 4″, 362 pounds	3.973
Side plate C, 27′ 4″, 210 pounds	2.305
Side plate D, 27′ 4″, 206 pounds	2.261
Four angles, each 27′ 4″, 84 pounds	3.688
	16.267

Width of plates A and B, 12″.10.
Width of plates C and D, 7″.50.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates in 20-inch section.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0075	.....	0.	—.03	.0008	
30,000	.0135	.....	0.	—.04	.0012	
40,000	.0195	.....	0.	—.04	.0020	
50,000	.0250	.....	0.	—.04	.0022	
60,000	.0305	.....	0.	—.05	.0024	
70,000	.0365	.....	0.	—.05	.0030	
80,000	.0424	.....	0.	—.05	.0035	
90,000	.0480	.....	0.	—.05	.0040	
100,000	.0538	.....	0.	—.05	.0040	
10,000	.....	.0004	0.	—.03	.0010	
120,000	.0650	.....	0.	—.05	.0052	
140,000	.0762	.....	0.	—.06	.0065	
160,000	.0880	.....	0.	—.06	.0074	
180,000	.0993	.....	0.	—.06	.0088	
200,000	.1110	.....	—.01	—.06	.0100	
10,000	.....	.0005	0.	—.04	.0020	
220,000	.1225	.....	—.01	—.07	.0120	
240,000	.1340	.....	—.01	—.07	.0130	
260,000	.1460	.....	—.01	—.07	.0164	
280,000	.1575	.....	—.02	—.07	.0188	
300,000	.1700	.....	—.02	—.07	.0240	
10,000	.....	.0020	0.	—.04	.0110	
310,000	.1764	.....	—.03	—.07	.0270	
320,000	.1824	.....	—.03	—.08	.0287	
330,000	.1890	.....	—.04	—.08	.0298	
340,000	.1954	.....	—.04	—.08	.0330	
350,000	.2025	.....	—.05	—.09	.0360	
360,000	.2094	.....	.....	—.10	.0395	
370,000	.2165	.....	—.06	—.10	.0439	
380,000	.2240	.....	—.07	—.10	.0500	
390,000	.2312	.....	—.09	—.10	.0558	
400,000	.2373	.....	—.10	—.10	.0585	
10,000	.....	.0105	—.04	—.06	.0372	
410,000	.2445	.....	—.11	—.11	.0638	
420,000	.2530	.....	—.12	—.12	.0710	
.....	.2535	.....	.....	.....	.0724	After sustaining load 2 minutes.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates in 20-inch section.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
425,000	.....	.....	—.17	—.12	.....	
430,000	.....	.....	—.20	—.12	.....	
435,000	.....	.....	—.23	—.12	.....	
440,000	.....	.....	—.27	—.13	.....	
445,000	.....	.....	—.31	—.12	.....	
450,000	.....	.....	—.38	—.13	.....	
454,000	.....	.....	—.73	—.15	.....	Ultimate strength =27,910 pounds per square inch.
.....	.....	.....	—1.40	—.16	.....	Rapid yielding began when these deflections were reached.
377,000	.....	.....	—2.12	—.20	.....	Load now sustained.
10,000	.....	.....	—.97	—.11	.....	Rested 40 hours.
387,700	.....	.....	—2.22	—.20	.....	Load sustained after above rest.
.....	.....	.....	—3.45	.....	.....	Sprung suddenly between these deflections, buckling-plates A, B, and D, between rivets concave side, at middle of post.
.....	.....	.....	—4.90	.....	.....	
10,000	.....	.....	—3.70	.....	.....	Load sustained after above sudden springing and buckling of plates.
153,000	.....	.....	—5.20*	.....	.....	

*About.

Total slip of eye-plates, about ".10.

WROUGHT-IRON COLUMNS.

SET G.—$\frac{1}{16}$" *continuous plates and angles.*

No. 1651.

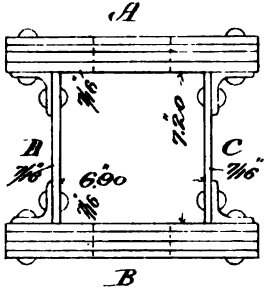
Length, center to center, of 3½" pins, 320" = 26′ 8".
Gauged length, 260".
Weight, 2,242 pounds.
Counter-weight at middle, 1,120 pounds.

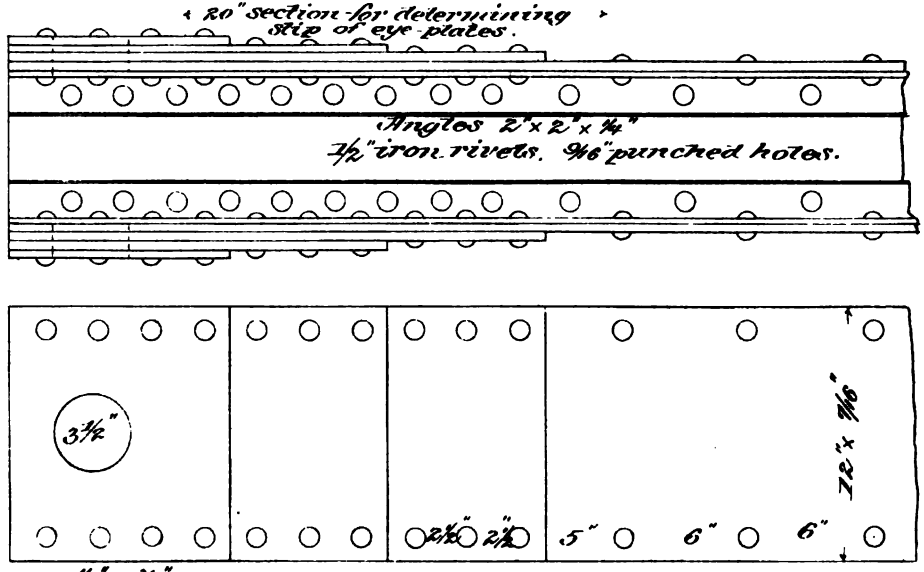
Sectional area.

	Square inches.
Upper plate A, 12".00 wide, 27′ 4", 469 pounds	5.444
Under plate B, 11".82 wide, 27′ 4", 519 pounds	5.697
Side plate C, 7".00 wide, 27′ 4", 284 pounds	3.117
Side plate D, 6".85 wide, 27′ 4", 274 pounds	3.008
Angles each, 27′ 4", 84 pounds	3.688
Total	20.954

Set G.

General dimensions



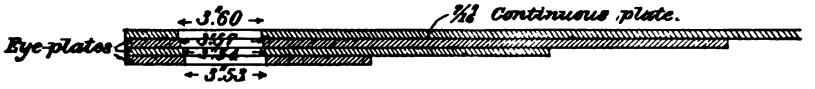


S. EX. 5, 1, 48.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates in 20-inch section.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0050	.....	0.	—.02	.0010	
40,000	.0163	.....	0.	—.06	.0022	
60,000	.0248	.....	0.	—.06	.0034	
80,000	.0326	.....	0.	—.05	.0042	
100,000	.0416	.....	0.	—.06	.0054	
10,000	.....	—.0005	0.	—.01	.0011	
120,000	.0502	.....	0.	—.06	.0069	
140,000	.0590	.....	0.	—.07	.0080	
160,000	.0680	.....	0.	—.07	.0099	
180,000	.0770	.....	0.	—.07	.0112	
200,000	.0864	.....	0.	—.08	.0140	
10,000	.....	—.0005	0.	—.02	.0062	
220,000	.0955	.....	0.	—.09	.0152	
240,000	.1050	.....	0.	—.10	.0180	
260,000	.1147	.....	0.	—.10	.0199	
280,000	.1250	.....	0.	—.12	.0240	
300,000	.1350	.....	.01	—.13	.0270	
10,000	.....	.0015	0.	—.05	.0152	
320,000	.1450	.....	.01	—.15	.0305	
340,000	.1550	.....	.....	—.16	.0352	
360,000	.1662	.....	.02	—.18	.0410	
380,000	.1790	.....	.03	—.22	.0470	
400,000	.1905	.....	.04	—.25	.0520 .0540	Slip of plates after 1 minute's rest.
10,000	.....	.0080	0.	—.10	.0360	
410,000	.....	.....	.04	—.25	.....	
420,000	.....	.....	.04	—.28	.....	
430,000	.....	.....	.05	—.29	.....	
440,000	.....	.....	.06	—.30	.....	
450,000	.....	.....	.06	—.33	.....	
460,000	.....	.....	.07	—.35	.....	
470,000	.....	.....	.08	—.39	.....	
480,000	.....	.....	.09	—.41	.....	
490,000	.....	.....	.11	—.49	.....	
500,000	.....	.....	.13	—.51	.....	
10,000	.....	.....	.04	—.24	.....	
505,000	.....	.....	.13	—.58	.....	
510,000	.....	.....	.17	—.61	.....	
515,000	.....	.....	.18 .18	—.64 —.70	.....	After 5 minutes' rest.
520,000	.....	.....	.19	—.71	.....	
525,000	.....	.....	.22	—.74	.....	
530,000	.....	.....	.24	—.80	.....	
			.30	—.91	.....	After 5 minutes' rest.
535,000	.....	.....	.31	—.92	.....	
			.42	—1.09	.....	After 5 minutes' rest.
540,000	.....	.....	.47	1.13	.....	Ultimate strength=25,770 pounds per square inch.
			.60	—1.26	.....	After 2 minutes' rest.
535,000	.....	.....	.66	—1.30	.....	Yielding under this load, when test was discontinued.

Failed by deflection in diagonal direction.

Sketch showing elongation of pin holes and slipping of eye-plates, after the test.



No. 1652.

Length, center to center, of 3½″ pins, 320″.10 = 26′ 8″.10.
Gauged length, 260″.
Weight, 2,225 pounds.
Counter-weight at middle, 1,110 pounds.

Sectional area.

	Square inches.
Upper plate A, 27′ 4″, 12″.00 wide, 499 pounds	5.477
Under plate B, 27′ 4″, 12″.08 wide, 500 pounds	5.488
Side plate C, 27′ 4 ′, 7″.05 wide, 274 pounds	3.008
Side plate D, 27′ 4″, 7″.00 wide, 269 pounds	2.952
Angles each, 27′ 4″, 84 pounds	3.688
Total	20.613

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates in 20-inch section.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0032	.....	0.	.01	0.	
40,000	.0153	.....	0.	—.00½	0.	
60,000	.0252	.....	0.	—.01	.0002	
80,000	.0345	.....	0.	—.01	.0005	
100,000	.0433	.....	0.	—.01	.0010	
10,000	.....	0.	0.	0.	0.	
120,000	.0523	.....	.01	—.01	.0012	
140,000	.0612	.....	.01	—.01	.0020	
160,000	.0703	.....	.02	—.01	.0027	
180,000	.0792	.....	.02	—.01	.0035	
200,000	.0884	.....	.02	—.01	.4042	
10,000	.....	0.	0.	—.02	0.	
220,000	.0976	.....	.02	—.01	.0052	
240,000	.1065	.....	.....	.....	.0068	
260,000	.1152	.....	.04	—.01	.0097	
280,000	.1240	.....	.....	.....	.0115	
300,000	.1330	.....	.05	0.	.0139	
10,000	.....	.0004	0.	—.02	.0053	
320,000	.1420	.....	.05	0.	.0170	
340,000	.1512	.....	.06	0.	.0206	
360,000	.1600	.....	.07	—.01	.0235	
380,000	.1700	.....	.09	—.01	.0305	
400,000	.1803	.....	.10	—.01	.0360	
10,000	.....	.0038	0.	—.03	.0192	
420,000	.1906	.....	.12	—.02	.0440	
440,000	.2002	.....	.13	—.03	.0530	
460,000	.2108	.....	.18	—.03	.0630	
480,000	.2212	.....	.21	—.03	.0740	
10,000	.....	.0095	.02	—.05	.0460	
490,000	.....	.....	.22	—.03	.....	
500,000	.....	.....	.24	0.	.....	
510,000	.....	.....	.27	.01	.....	
520,000	.....	.....	.32	.06	.....	
530,000	.....	.....	.38	.09	.....	
535,000	.....	.....	.50 .53	.28 .40	.....	Ultimate strength = 25,950 pounds per square inch.

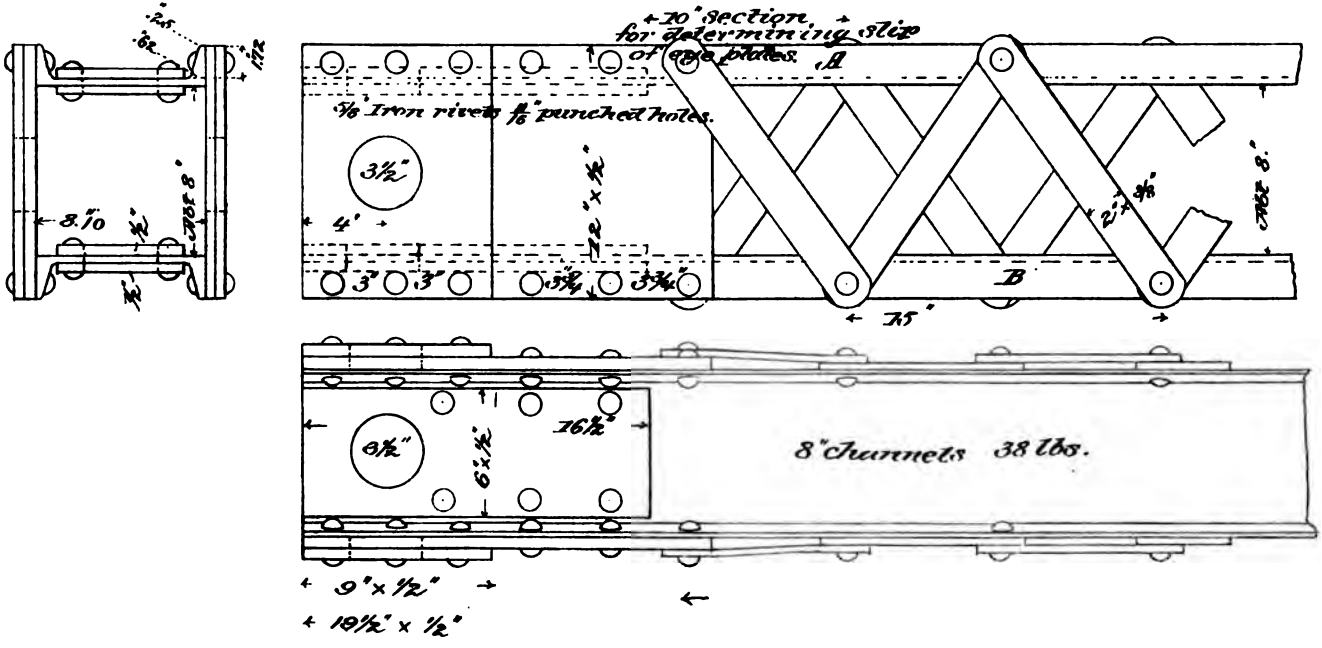
Failed by shearing rivets securing eye-plates to continuous plate A.

Rivets did not fill the holes; the longest rivets having the most clearance.

Average diameter of rivets passing through three eye-plates, continuous plate A, and angle iron, ″.52.

Set H

General dimensions



S. EX. 5 , 1, 48.

WROUGHT-IRON COLUMNS.

SET H.—*8-inch channels, latticed.*

No. 746.

(Tested with pins parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 159″.20 = 13′ 3″.20.
Gauged length, 120″.
Total weight, 679 pounds.
Counter-weight at middle, 340 pounds.
Distance between channels, 8″.

Sectional area.

	Square inches.
Channel A, 14′ 0″, 176 pounds, web ″.29	3.771
Channel B, 14′ 0″, 150 pounds, web ″.29	3.857
	7.628

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0020	.....	0.	0.	
20,000	.0075	.....	0.	—.02	
30,000	.0130	.....	0.	—.03	
40,000	.0190	.....	0.	—.03	
50,000	.0241	.....	0.	—.03	
5,000	.....	0.	.....	—.03	
60,000	.0280	.....	0.	—.03	
80,000	.0395	.....	0.	.....	
100,000	.0512	.....	0.	—.03	
5,000	.....	.0008	.....	—.03	
120,000	.....	.....	0.	—.03	
140,000	.....	.....	0.	—.01	
160,000	.....	.....	0.	0.	
180,000	.....	.....	0.	.01	
200,000	.....	.....	0.	.02	
220,000	.....	.....	.01	.03	
230,000	.....	.....	.02	.04	
240,000	.....	.....	.03	.06	
250,000	.....	.....	.05	.07	
258,700	.....	.....	.10	.05	Ultimate strength = 33,910 pounds per square inch.

Failed by horizontal deflection; channel A being on the concave side.
Deflections increased to 1″.50, slightly buckling channel bar on concave side between the latticing.
Pin holes elongated, ″.01.
Scale disturbed in front of pins, at inside eye-plates.

No. 747.

(Tested with pins parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 159″.27=13′ 3″.27.
Gauged length, 120″.
Total weight, 707 pounds.
Counter-weight at middle, 353 pounds.
Distance between channels, 8″.

Sectional area.

	Square inches.
Channel A, 14′ 0″, 188 pounds, web ″.37	4.028
Channel B, 14′ 0″, 188 pounds, web ″.37	4.028
	8.056

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0022	.....	0.	0.	
20,000	.0076	.....	—.01	.02	
30,000	.0130	.....	—.01	.03	
40,000	.0185	.....	—.01	.03	
50,000	.0235	.....	—.01	.03	
5,000	.....	.0010	.....	.....	
60,000	.0290	.....	—.01	.04	
80,000	.0395	.....	—.01	.05	
100,000	.0500	.....	—.01	.05	
5,000	.....	.0011	0.	0.	
120,000	.....	.....	—.01	.05	
140,000	.....	.....	—.01	.06	
160,000	.....	.....	—.01	.07	
180,000	.....	.....	—.01	.08	
200,000	.....	.....	—.01	.10	
220,000	.....	.....	—.01	.11	
230,000	.....	.....	—.02	.12	
240,000	.....	.....	—.02	.13	
250,000	.....	.....	—.03	.15	
260,000	.....	.....	—.03	.16	
270,000	.....	.....	—.04	.17	
280,000	.....	.....	—.05	.20	
290,000	.....	.....	—.07	.22	
294,700	.....	.....	—.18	.31	Ultimate strength = 36,580 pounds per square inch.

Failed by horizontal deflection, channel A being on the convex side
Deflections increased to —1″.50 horizontal, the vertical deflection in the meantime changing from +″.31 to —″.15.
Channel A took a sharp buckle between latticing at middle of column.
Pin holes of inside eye-plates elongated ″.03.

No. 748.

(Tested with pins parallel to channel-bar webs.)

Length, center to center, of 3½″ pins, 239″.60 = 19′ 11″.60.
Gauged length, 200″.
Total weight, 924 pounds.
Counter-weight at middle, 462 pounds.
Distance between channels, 7″.90.

Sectional area.

	Square inches.
Channel A, 20′ 8″, 263 pounds, web ″.29	3.818
Channel B, 20′ 8″ 262 pounds, web ″.29	3.803
	7.621

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.		0.	0.	
10,000	.0040		0.	.04	
20,000	.0135		—.01	.06	
30,000	.0230		—.01	.07	
40,000	.0317		—.01	.07	
50,000	.0410		—.02	.07	
5,000		0.		.07	
60,000	.0505		—.02	.07	
80,000	.0688		—.02	.07	
100,000	.0870		—.02	.08	
5,000		0.			
120,000			—.02	.09	
140,000			—.02	.10	
160,000			—.03	.09	
180,000			—.05	.06	
200,000			—.08	.04	
210,000			—.10	.02	
220,000			—.12	.01	Snapping sounds from scale breaking off.
230,000			—.15	.0	
240,000			—.18	.0	
250,000			—.23	—.01	
255,000			—.30	—.01	
260,000			—.49	+.01	Ultimate strength = 34,120 pounds per square inch.

Failed by horizontal deflection perpendicular to plane of pins.

No. 749.

(Tested with pins parallel to webs of channel-bars.)

Length, center to center, of 3½″ pins, 239″.60 = 19′ 11″.60.
Gauged length, 200″.
Weight, 928 pounds.
Counter-weight at middle, 464 pounds.
Distance between channels, 7″.90.

Sectional area.

	Square inches.
Channel A, 20′ 8″, 260 pounds, web ″.28	3.774
Channel B, 20′ 8″, 265 pounds, web ″.28	3.847
	7.621

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0045	.....	0.	—.01	
20,000	.0130	.....	0.	—.06	
30,000	.0220	.....	0.	—.08	
40,000	.0310	.....	0.	—.08	
50,000	.0405	.....	0.	—.08	
5,000	.....	—.0010	.....	.....	
60,000	.0491	.....	0.	—.09	
80,000	.0675	.....	0.	—.09	
100,000	.0860	.....	0.	—.09	
5,000	.....	—.0019	.....	.....	
120,000	.....	.....	0.	—.09	
140,000	.....	.....	0.	—.09	
160,000	.....	.....	0.	—.09	
180,000	.....	.....	0.	—.09	
200,000	.....	.....	—.01	—.07	
210,000	.....	.....	—.02	—.06	
220,000	.....	.....	—.02	—.05	
230,000	.....	.....	—.01	—.05	Snapping sounds; scale cracking off.
240,000	.....	.....	0.	—.07	
250,000	.....	.....	.04	—.13	
254,600	.....	.....	.20	—.30	Ultimate strength = 33,410 pounds per square inch.

Failed by deflecting horizontally and downward.
Loads continued till horizontal deflection reached 2″, the vertical deflection now —″.53.
Channel A on concave side.
Pin holes of inside eye-plates elongated ″.02 each. Pin holes of outside eye-plates elongated about ″.00½ each.

No. 1648.

(Tested with pins horizontal, parallel to webs of channel-bars.)

Length, center to center, of 3½ pins, 319″.90 = 26′ 7″.90.
Gauged length, 260″.
Weight, including two sets of eye-plates, 1,265 pounds.
Counter-weight at middle, 600 pounds.
Distance between channels, 7″.92.

Sectional area.

	Square inches.
Channel A, 27′ 4″, 350 pounds, web ″.28	3.841
Channel B, 27′ 4″, 352 pounds, web ″.30	3.864
	7.705

Slip of eye-plates, measured in 10-minute section, as shown on sketch.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0110	.....	0.	0.	.0008	
30,000	.0235	.....	.01	0.	.0012	
40,000	.0353	.....	.01	0.	.0020	
50,000	.0475	.....	.01	0.	.0030	
60,000	.0594	.....	.02	0.	.0039	
70,000	.0716	.....	.03	0.	.0049	
80,000	.0834	.....	.04	0.	.0060	
90,000	.0958	.....	.05	0.	.0072	
100,000	.1080	.....	.05	0.	.0084	
10,000	.....	0.	.01	0.	.0030	
110,000	.1202	.....	.05	0.	.0103	
120,000	.1325	.....	.06	0.	.0120	
130,000	.1452	.....	.07	— .1	.0139	
140,000	.1590	.....	.08	— .02	.0154	
150,000	.1700	.....	.08	— .02	.0175	
160,000	.1825	.....	.09	— .03	.0190	
170,000	.1960	.....	.09	— .03	.0220	
180,000	.2090	.....	.09	— .03	.0252	
190,000	.2225	.....	.10	— .03	.0289	
200,000	.2365	.....	.11	— .03	.0330	
10,000	.....	.0050	.04	+ .03	.0209	
210,000	.2500	.....	.14	0.	.0380	
220,000	.2655	.....	.17	0.	.0438	
225,000	.2745	.....	.18	0.	.0451	
230,000	.2840	.....	.21	— .01	.0490	
235,000	.2952	.....	.27	— .02	.0500	
240,000	.3118	.....	.38	— .04	.0522	
243,600	.....	About	.55	— .10	.0522	Ultimate strength = 31,610 pounds per square inch.
Failed by horizontal deflection parallel to axis of 3½″ pins.						
238,000	.....	.....	.80	— .13	.....	Loads and deflections recorded as pressure fell.
230,000	.....	.....	1.28	— .19	.....	
220,000	.....	.....	1.60	— .20	.....	
214,000	.....	.....	2.00	— .26	.....	
10,000	.....	.....	1.45	— .02	.....	

No. 1649.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 319″.85 = 26′ 7″.85.
Gauged length, 260″.
Weight, including two sets of eye-plates, 1,255 pounds.
Counter-weight at middle, 600 pounds.
Distance between channels, 7″.85.

Sectional area.

	Square inches.
Channel A, 27′ 4″, 347 pounds, web, ″.28	3.809
Channel B, 27′ 4″, 352 pounds, web, ″.28	3.864
	7.673

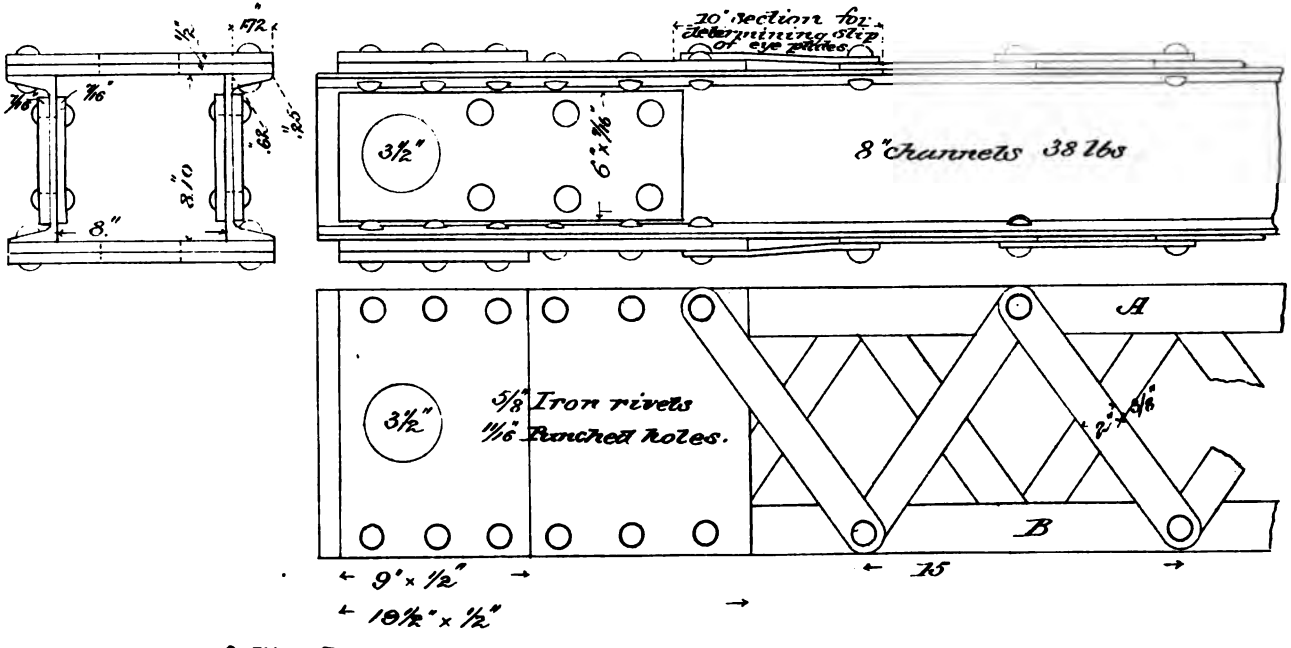
Slip of eye-plates measured in 10-inch section.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0110	.....	.01	0.	.0015	
30,000	.0230	.....	.05	0.	.0040	
40,000	.0350	.....	.05	0.	.0055	
50,000	.0480	.....	.07	0.	.0070	
60,000	.0600	.....	.08	−.01	.0085	
70,000	.0727	.....	.09	−.01	.0100	
80,000	.0848	.....	.09	−.01	.0115	
90,000	.0970	.....	.10	−.01	.0130	
100,000	.1094	.....	.11	−.01	.0150	
10,000	.....	.0016	.05	−.01	.0094	
110,000	.1225	.....	.13	−.02	.0170	
120,000	.1340	.....	.13	−.03	.0190	
130,000	.1470	.....	.14	−.03	.0210	
140,000	.1590	.....	.15	−.03	.0235	
150,000	.1726	.....	.17	−.03	.0254	
160,000	.1857	.....	.19	−.03	.0282	
170,000	.2010	.....	.20	−.03	.0300	
180,000	.2150	.....	.21	−.04	.0338	
190,000	.2350	.....	.25	−.06	.0368	
200,000	.2550	.....	.30	−.10	.0400	
10,000	.....	.0228	.14	−.02	.0276	
205,000	.....	.....	.35	−.11	.....	
210,000	.....	.....	.40	−.13	.....	
215,000	.....	.....	.44	−.15	.....	
220,000	.....	.....	.51	−.19	.....	
225,000	.....	.....	.63	−.27	.....	
226,000	.....	.....	.70	−.30	.....	
228,300	.....	.....	.80	−.40	.....	
229,200	.....	.....	.86	−.46	.....	Ultimate strength = 29,870 pounds per square inch.
Deflected in diagonal direction which finally changed to vertical deflection only.						
*220,000	.....	.....	1.22	−1.60	.....	
190,000	.....	.....	1.20	−2.10	.....	
10,000	.....	.....	.80	−1.23	.....	

*About.

Set I (Swelled sides)

General dimensions



S. EX. 5, 1, 48.

WROUGHT-IRON COLUMNS.

SET. I.—8″ *channels latticed, swelled sides.*

No. 740.

Length, center to center, of 3½″ pins, 159″.9=13′ 3″.9.
Gauged length, 120″.
Total weight, 684 pounds.
Counter-weight at middle, 342 pounds.
Distance between channels at ends, 8″.
Distance between channels at middle, 9½″.
Swell, 1½″.

Sectional area.

	Square inches.
Channel A, 14′ 2″ 180 pounds, web ″.30	3.812
Channel B, 14′ 2″ 181 pounds, web ″.30	3.833
	7.645

Compressions measured along center of channel bar A, with pins horizontal, parallel to webs of channel bars.

Post then rotated, bringing pins vertical, when deflections were measured, and test continued to the ultimate load.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0026	.....	0.	—.01	
20,000	.0081	.....	0.	—.02	
30,000	.0140	.....	0.	—.03	
40,000	.0194	.....	0.	—.03	
50,000	.0250	.....	0.	—.03	
5,000	.....	.0019	0.	0.	
60,000	.0308	.....	0.	—.03	
80,000	.0426	.....	0.	—.03	
100,000	.0535	.....	0.	—.03	
5,000	.....	.0019	0.	0.	
120,000	.....	.....	0.	—.02	
140,000	.....	.....	0.	—.01	
160,000	.....	.....	0.	0.	
180,000	.....	.....	0.	0.	
200,000	.....	.....	0.	0.	
220,000	.....	.....	.01	0.	
230,000	.....	.....	.02	0.	Slight snapping sounds, scale starting off.
240,000	.....	.....	.0	0.	
250,000	.....	.....	.05	0.	
260,000	.....	.....	.12	0.	
262,500	.....	.....	.43	.07	Ultimate strength = 34,340 pounds per square inch.
			0		

Failed by horizontal deflection, perpendicular to axis of pins; channel A being on the concave side.

Deflection increased to ″.70 when channel A began to buckle between latticing. It was most distorted about 4 feet from end.

No. 741.

(Tested with pins parallel to webs of channel-bars.)

Length, center to center, of 3½″ pins, 159″.9=13′ 3″.9.
Gauged length on channel A, 120″.
Total weight, 684 pounds.
Counter-weight at middle, 342 pounds.
Distance between channels: At ends, 8″.; at middle, 9″.50.

Sectional area.

	Square inches.
Channel A, 14′ 2″, 181 pounds, web ″.30	3.833
Channel B, 14′ 2 ′, 179 pounds, web ″.30	3.791
	7.624

Tested in same manner as No. 740.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0033	.....	0.	0.	
20,000	.0076	.....	0.	0.	
30,000	.0130	.....	0.	0.	
40,000	.0184	.....	0.	0.	
50,000	.0245	.....	0.	0.	
5,000	.....	.0012	0.	0.	
60,000	.0298	.....	0.	.01	
80,000	.0406	.....	0.	.01	
100,000	.0516	.....	0.	.02	
5,000	.....	.0015	0.	0.	
120,000	.....	.....	0.	.02	
140,000	.....	.....	0.	.02	
160,000	.....	.....	0.	.02	
180,000	.....	.....	0.	.02	
200,000	.....	.....	0.	.02	
210,000	.....	.....	0.	.02	
220,000	.....	.....	—.01	.02	
230,000	.....	.....	—.01	.02	
240,000	.....	.....	—.04	.02	
250,000	.....	.....	—.07	.02	
255,650	.....	.....	—.17	.02	Ultimate strength = 33,530 pounds per square inch.

Failed by horizontal deflection perpendicular to the plane of the pins; channel A being on the convex side.

Test continued till horizontal deflection was —1″.

Channel-bar on concave side buckled between latticing. Maximum distortion occurred about 5 feet from end. Inside eye-plates had scale disturbed in front of pins.

No. 739.

Length, center to center, of 3½″ pins, 239″.70=19′ 11″.70.
Gauged length, 200″.
Weight, 921 pounds.
Counter-weight at middle, 460 pounds.
Distance between channels: At ends, 8″; at middle, 10″.
Swell, 2″.

Sectional area.

	Square inches.
Channel A. 20′ 10″, 262 pounds, web ″.31	3.773
Channel B, 20′ 10″, 260 pounds, web ″.30	3.744
	7.517

Tested with pins horizontal when compression of post was measured; column then rotated, bringing pins vertical, and tested to destruction.
Pins parallel to webs of channel bars.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	Gauge rods laid along web of channel bar A.
10,000	.0040	.....	0.	.01	
20,000	.0132	.....	0.	.05	
30,000	.0230	.....	0.	.06	
40,000	.0320	.....	0.	.07	
50,000	.0420	(—.0009)	.....	.....	
5,000	.....	.....	.....	.....	
60,000	.0512	.....	0.	.07	
80,000	.0700	.....	0.	.07½	
100,000	.0890	.....	0.	.07½	
5,000	.....	—.0010	0.	0.	
120,000	.....	.....	0.	.07½	
140,000	.....	.....	0.	.08	
160,000	.....	.....	0.	.09	
180,000	.....	.....	0.	.09	
200,000	.....	.....	0.	.10	Snapping sounds.
220,000	.....	.....	.01	.11	
240,000	.....	.....	.03	.14	Scale generally started off webs of channel bars opposite lattice-bar rivets.
250,000	.....	.....	.01	.22	
251,000	.....	.....	—.01	.34	Ultimate strength = 33,390 pounds per square inch.

Failed by deflecting upwards, parallel to axis of pins. Channel bar A being on convex side.
No apparent slipping of eye-plates.
Pin holes not elongated.
Scale started off channel-bar webs opposite rivets in lattice bars.

No. 750.

(Tested with pins parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 239″.70=19′ 11″.70.
Gauged length, 200″.
Weight, 929 pounds.
Counter-weight at middle, 464 pounds.
Distance between channels: At ends, 8″; at middle, 10″.10.
Swell, 2″.10.

Sectional area.

	Square inches.
Channel A, 20′ 10″, 260 pounds, web ″.29	3.744
Channel B, 20′ 10″, 263 pounds, web ″.29	3.787
	7.531

Tested in same manner as No. 740.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
5,000	0.	.....	0.	0.	
10,000	.0040	.....	0.	—.01	
20,000	.0131	.....	0.	.01	
30,000	.0231	.....	0.	0.	
40,000	.0317	.....	0.	0.	
50,000	.0410	.....	0.	0.	
5,000	.....	.0030	.....	.....	
60,000	.0503	.....	0.	0.	
80,000	.0690	.....	0.	0.	
100,000	.0876	.....	0.	0.	
5,000	.....	.0028	.....	.....	
120,000	.....	.....	0.	.01	
140,000	.....	.....	—.01	.01	
160,000	.....	.....	.01	.01	
180,000	.....	.....	.01	.01	
200,000	.....	.....	.01	0.	Snapping sounds; scale cracking off.
210,000	.....	.....	—.01	0.	
220,000	.....	.....	.01	0.	
230,000	.....	.....	.01	—.01	
240,000	.....	.....	.01	—.02	
245,000	.....	.....	.01	—.05	
250,000	.....	.....	.01	.05	
255,000	.....	.....	.01	—.07	
259,000	.....	.....	0.	—.08	Ultimate strength=34,390 pounds per square inch.

Loads continued till horizontal deflection reached 2″; vertical deflection about ″.05. Channel B buckled between the latticing, at 3 to 4 feet from end.

Scale disturbed on flanges of channel bars along column from end to end. Pin holes of inside eye-plates elongated ″.01 to ″.02 each.

No. 1643.

(Tested with pins horizontal, parallel to webs of channel-bars.)

Length, center to center, of 3½″ pins, 319″.80=26′ 7″.80.
Gauged length, 280″.
Total weight (including two sets of eye-plates), 1,277 pounds.
Counter-weight at middle, 620 pounds.
Distance between channels: At ends, 8″; At middle, 10″.75.
Swell, 2″.75.

Sectional area.

	Square inches.
Channel A, 27′ 6″, 353 pounds, web ″.30	3.851
Channel B, 27′ 6″, 352 pounds, web ″.31	3.840
	7.691

To determine the slip of eye-plates, measurements were taken at one end of the column, with the "dial gauge." This instrument covered a length of 10″; one end was secured to the flange of channel-bar A, and one end secured to the inside eye-plate.

Loads applied.	Compression.	Compression sets.	Deflections. Horizontal.	Deflections. Vertical.	Slip of eye-plates.	Remarks.
Pounds	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0130	.....	0.	0.	.0005	
30,000	.0262	.....	0.	0.	.0016	
40,000	.0400	.....	0.	0.	.0030	
50,000	.0531	.....	0.	0.	.0043	
60,000	.0670	.....	0.	0.	.0060	
70,000	.0800	.....	.0.	0.	.0073	
80,000	.0930	.....	— .01	— .00½	.0085	
90,000	.1070	.....	— .01	— .00½	.0100	
100,000	.1204	.....	— .02	— .01	.0110	
10,000	.....	.0016	0.	+ .00½	.0055	
110,000	.1345	.....	— .04	— .02	.0124	
120,000	.1478	.....	— .05	— .02	.0135	
130,000	.1620	.....	— .06	— .03	.0149	
140,000	.1751	.....	— .07	— .04	.0158	
150,000	.1895	.....	— .08	— .05	.0172	
160,000	.2034	.....	— .09	— .06	.0182	
170,000	.2171	.....	— .10	— .08	.0205	
180,000	.2314	.....	— .10	— .09	.0221	
190,000	.2470	.....	— .11	— .10	.0258	
200,000	.2630	.....	— .13	— .11	.0280	
10,000	.....	.0080	— .04	— .09½	.0142	
210,000	.2806	.....	— .17	— .13	.0333	
220,000	.3000	.....	— .22	— .16	.0365	
225,000	.3104	.....	— .26	— .18	.0398	
230,000	.3258	.....	— .32	— .21	.0415	
235,000	.3410	.....	— .41	— .25	.0470	
237,000	.....	.....	— .67	— .36	.....	
237,200	.....	.....	— .71	— .39	.....	Ultimate strength = 30,840 pounds per square inch.
231,000	.....	.....	—1.24	— .51	.....	
228,000	.....	.....	—1.38	— .52	.....	
217,000	.....	.....	—1.80	— .57	.....	Load sustained when test with pins parallel to webs of channel was discontinued.
10,000	.....	.....	—1.27	— .33	.....	

The post has a sharp bend at the middle, the channels buckled slightly.
Post removed from testing-machine and pins placed through pin-holes in webs of channels.
Post now tested with pins vertical.
Rested between tests half hour.

No. 1643 *a*.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	—1.27	—.33	.....	
100,000	.....	.....	—2.19	—.29	.....	
121,000	.....	.....	—2.78	—.30	.....	
127,800	.....	.....	—3.50	—.29	.....	Ultimate strength = 16,620 pounds per square inch.
118,000	.....	.....	—4.46	—.29	.....	
108,000	.....	.....	—5.42	—.25	.....	
10,000	.....	.....	—2.65	—.25	.....	Test discontinued.

Maximum distortion of the channel-bars took place at middle of the column, where intersecting "Cooper lines" were developed in diagonal lines, and also in lines at right angles to the axis of the column.

The latter lines were developed opposite the lattice-bar rivets, along half the length of column.

No. 1644.

Length, center to center, of 3½″ pins, 319″.92 = 26′ 7″.92.
Gauged length, 280″.
Total weight, including two sets of eye-plates, 1,2 0 pounds.
Counter-weight at middle, 620 pounds.
Distance between channels at ends, 8″.
Distance between channels at middle, 10.″85.

Sectional area.

	Square inches.
Channel A, 27″ 6″, 353 pounds; web ″.28	3.851
Channel B, 27″ 6″, 353 gounds; web ″.28	3.851
	7.702

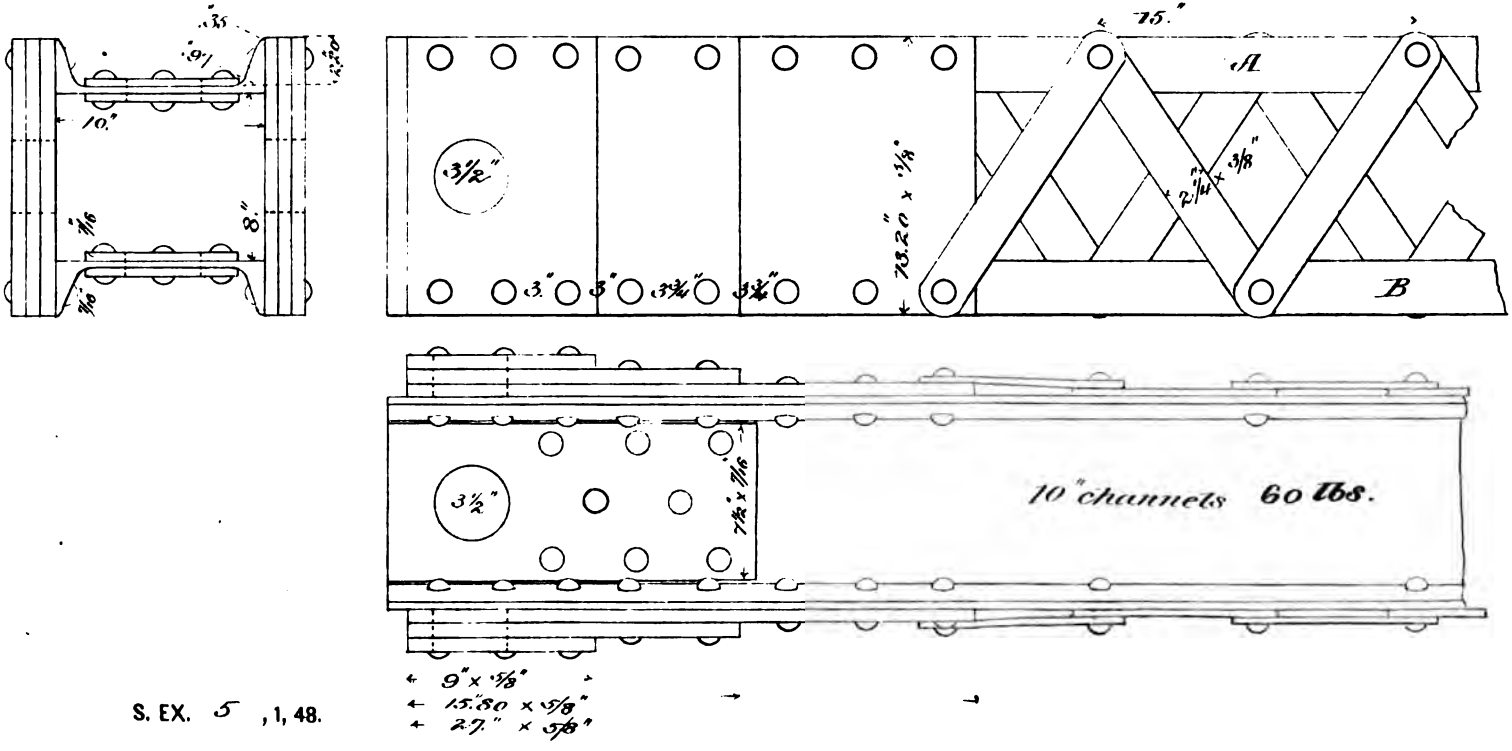
Three and a half inch pins in horizontal position, parallel to webs of channel bars.

Slip of eye-plates determined in same manner as for No. 1643.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	0.	
20,000	.0122	.....	—.01	.01	.0002	
30,000	.0250	.....	—.01	.01	.0010	
40,000	.0380	.....	—.01	.02	.0020	
50,000	.0505	.....	—.01	.03	.0030	
60,000	.0631	.....	—.01	.03	.0048	
70,000	.0730	.....	—.02	.03	.0065	
80,000	.0890	.....	—.04	.03	.0095	
90,000	.1015	.....	—.05	.03	.0112	
100,000	.1145	.....	—.05	.03	.0143	
10,000	.....	0.	—.00½	0.	.0081	
110,000	.1275	.....	—.07	.01	.0175	
120,000	.1404	.....	—.07	.01	.0192	
130,000	.1535	.....	.....	.....	.0218	
140,000	.1665	.....	—.09	.01	.0235	
150,000	.1798	.....	—.09	0.	.0270	
160,000	.1934	.....	—.01	0.	.0295	
170,000	.2065	.....	—.11	.01	.0344	
180,000	.2195	.....	—.13	.02	.0386	
190,000	.2330	.....	—.15	.03	.0462	
200,000	.2468	.....	—.17	.04	.0515	

Set L

General dimensions



S. EX. 5 , 1, 48.

Loads applied.	Compression.	Compression sets.	Deflections.		Slip of eye-plates.	Remarks.
			Horizontal.	Vertical.		
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.0046	—.07	.02	.0352	
210,000	.2600	.....	—.20	.05	.0600	
215,000	.2675	.....	—.22	.08	.0630	
220,000	.2752	.....	—.25	.11	.0685	
225,000	.2823	.....	—.27	.14	.0725	
227,000	.....	.....	—.30	.18	.0758	
230,000	.....	.....	—.31	.20	.....	
235,000	.....	.....	—.40	.27	.....	
237,000	.....	.....	—.47 —.63	.32 .50	.....	Ultimate strength = 30,770 pounds per square inch.
216,000	.....	.....	—.84	1.28	.....	Deflections taken as load gradually fell.
200,000	.....	.....	—.80	1.93	.....	
10,000	.....	.....	—.50	1.27	.....	

Deflected diagonally, immediately after passing the maximum load. As the deflections increased (the load on the post gradually falling off) the post took a more decided vertical movement.

WROUGHT-IRON COLUMNS.

SET L.—10″ *channels latticed.*

No. 1640.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 199″.84 = 16′7″ .84.
Gauged length, 160″.
Total weight, including two sets of eye-plates, 1,470 pounds.
Counter-weight at middle, 720 pounds.
Distance between channel bars, 8″.

Sectional area.

	Square inches.
Channel A, 17′ 4″; 345 pounds; web ″.32	5.972
Channel B, 17′ 4″; 345 pounds; web ″.32	5.972
	11.944

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0012	.....	0.	0.	
30,000	.0057	.....	0.	.00½	
40,000	.0105	.....	0.	0.00½	
50,000	.0150	.....	0.	.01	
60,000	.0200	.....	0.	.01	
70,000	.0248	.....	—.00½	.02	
80,000	.0291	.....	—.01	.02	
90,000	.0340	.....	—.01	.03	
100,000	.0390	.....	—.01	.03	
10,000	.....	0.	0.	0.	
110,000	.0440	.....	—.02	.03	
120,000	.0488	.....	—.02	.04	
130,000	.0535	.....	—.02	.04	
140,000	.0580	.....	—.02	.04	
150,000	.0630	.....	—.02	.04	
160,000	.0675	.....	—.02	.04	

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
170,000	.0720	.....	—.01	.03	
180,000	.0770	.....	—.01	.03	
190,000	.0815	.....	—.01	.03	
200,000	.0862	.....	—.01	.03	
10,000	.....	.0005	—.00½	0.	
210,000	.0908	.....	—.02	.03	
220,000	.0957	.....	—.03	.04	
230,000	.1005	.....	—.03	.04	
240,000	.1050	.....	—.03	.03	
250,000	.1100	.....	—.04	.03	
260,000	.1148	.....	—.04	.03	
270,000	.1198	.....	—.04	.03	
280,000	.1250	.....	—.05	.02	
290,000	.1300	.....	—.05	.02	
300,000	.1352	.....	—.05	.02	
10,000	.....	.0050	—.03	0.	
310,000	.1412	.....	.....	.....	
320,000	.1464	.....	—.06	.02	
330,000	.1529	.....	—.06	.02	
340,000	.1598	.....	—.07	.02	
345,000	.1630	.....	—.07	.02	
350,000	.1660	.....	—.07	.02	
360,000	.1733	.....	—.08	.02	
365,000	.1780	.....	—.08	.02	
370,000	.1842	.....	—.09	.02	
375,000	.1884	.....	—.09	.02	
380,000	.1945	.....	—.10	.02	
385,000	.2003	.....	.....	.02	
390,000	.2230	.....	—.11	.02	
395,000	.2325	.....	—.13	.02	
400,000	.2472	.....	—.16	.02	
		.....	—.21	.07	Ultimate strength = 33,740 pounds per square inch.
403,000	.2636	.....	—.25	.13	
		.....	—.28	.30	
376,000	.....	.....	—.28	.54	Load sustained immediately before releasing to initial load.
10,000	.....	.....	—.23	.45	

Post removed from testing-machine, and pins placed in second position, perpendicular to channel bars. Tested with pins in vertical position.

Rested between tests one-quarter hour.

No. 1640*a*.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	—.23	.45	
100,000	.....	.....	—.25	.40	
200,000	.....	.....	—.27	.40	
300,000	.....	.....	—.31	.45	
350,000	.....	.....	—.35	.50	
379,000	.....	.....	—.45	.55	Ultimate strength = 31,730 pounds per square inch.

Failed by horizontal deflection.

Maximum load sustained till horizontal deflection reached ".80, the vertical deflection unchanged at ".55.

When deflections reached horizontal —2" vertical ."50, the load sustained by the post was 310,000 pounds.

No. 1641.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of $3\frac{1}{2}''$ pins, $200'' = 16' 8''$.
Gauged length, $160''$.
Total weight, including two sets of eye-plates, 1,475 pounds.
Counter-weight at middle, 720 pounds.
Distance between channel bars, $7''.90$.

Sectional area.

	Square inches.
Channel A, 17′ 4″, 349 pounds; web ″.32	6.041
Channel B, 17′ 4⅛″, 362 pounds; web ″.34	6.261
	12.302

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0040	.....	0.	0.	
30,000	.0085	.....	0.	.00½	
40,000	.0135	.....	0.	.00½	
50,000	.0185	.....	0.	.01	
60,000	.0234	.....	0.	.02	
70,000	.0280	.....	0.	.02	
80,000	.0327	.....	0.	.02	
90,000	.0375	.....	0.	.03	
100,000	.0420	.....	0.	.04	
10,000	.....	.0002	0.	0.	
110,000	.0466	.....	—.01	.03	
120,000	.0510	.....	—.01	.03	
130,000	.0558	.....	—.01	.04	
140,000	.0610	.....	—.01	.04	
150,000	.0651	.....	—.02	.04	
160,000	.0700	.....	—.02	.04	
170,000	.0752	.....	—.03	.04	
180,000	.0800	.....	—.03	.04	
190,000	.0850	.....	—.04	.04	
200,000	.0900	.....	—.04	.04	
10,000	.....	0.	—.01	0.	
210,000	.0940	.....	—.04	.04	
220,000	.0988	.....	—.05	.04	
230,000	.1040	.....	—.05	.04	
240,000	.1090	.....	—.05	.04	
250,000	.1142	.....	—.05	.04	
260,000	.1195	.....	—.05	.04	
270,000	.1244	.....	—.05	.04	
280,000	.1293	.....	—.06	.04	
290,000	.1342	.....	—.06	.04	
300,000	.1398	.....	—.06	.04	
10,000	.....	.0035	—.62	.00½	
310,000	.1450	.....	—.06	.04	
320,000	.1500	.....	—.06	.04	
330,000	.1562	.....	—.06	.04	
340,000	.1620	.....	—.06	.04	
350,000	.1685	.....	—.07	.04	
360,000	.1750	.....	—.07	.04	
365,000	.1780	.....	—.07	.04	
370,000	.1820	.....	—.07	.04	
375,000	.1862	.....	—.07	.04	
380,000	.1900	.....	—.07	.04	
385,000	.1940	.....	—.08	.04	
390,000	.1980	.....	—.08	.04	
395,000	.2040	.....	—.09	.04	
400,000	.2100	.....	—.09	.04	
10,000	.....	.0260	—.06	.02	
405,000	.2212	.....	—.10	.05	
410,000	.2300	.....	—.11	.03	
413,700	.2480	.....	—.14	.02	

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
415,000	.2505	.....	—.14	.02	
420,000	.2612	.....	—.15	.02	
425,000	.....	.....	—.16	0.	
426,500	.....	.....	—.20	—.02	Ultimate strength = 34,670 pounds per square inch.
			—.23	—.09	
			—.27	—.18	
420,000	.....	.....	—.28	—.25	
			—.28	—.30	
10,000	.....	.....	—.23	—.30	

Post removed from testing-machine, and pins placed through pin holes in webs of channel bars.
Tested with pins in vertical position.
Rested between tests one-half hour.

No. 1641 A.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	—.23	—.30	
100,000	.....	.....	—.26	—.27	
200,000	.....	.....	—.30	—.26	
300,000	.....	.....	—.34	—.30	
400,000	.....	.....	—.45	—.36	Ultimate strength = 33,520 pounds per square inch.
			—.60	—.39	

Deflections continued to —1″ horizontal —42 vertical.
The channel-bar webs began to buckle between the latticing.

No. 1634.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 300″ = 25′ 0″.
Gauged length, 260″.
Total weight, 1,784 pounds.
Counter-weight at middle, 892 pounds.
Distance between channel bars, 7″.95.

Sectional area.

	Square inches.
Channel A, 25′ 8½″, 520 pounds; web, ″.33	6.074
Channel B, 25′ 8″, 520 pounds; web, ″.34	6.074
	12.148

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0070	.....	0.	.01	
30,000	.0149	.....	0.	.01	
40,000	.0226	.....	0.	.01	
50,000	.0302	.....	.01	.01	
60,000	.0380	.....	.02	.01	
70,000	.0461	.....	.02	.01	
80,000	.0542	.....	.02	.01	
90,000	.0615	.....	.03	.01	
100,000	.0694	.....	.03	.01	
10,000	.....	.0019	0.	.01	
110,000	.0772	.....	.03	.01	
120,000	.0846	.....	.03	.01	
130,000	.0928	.....	.03	.01	
140,000	.1005	.....	.04	.01	
150,000	.1085	.....	.05	.02	
160,000	.1161	.....	.05	.02	
170,000	.1240	.....	.05	.02	
180,000	.1320	.....	.06	.03	
190,000	.1400	.....	.07	.04	
200,000	.1479	.....	.07	.04	
10,000	.....	.0035	.03	.05	
210,000	.1562	.....	.07	.04	
220,000	.1639	.....	.07	.04	
230,000	.1718	.....	.08	.05	
240,000	.1801	.....	.08	.05	
250,000	.1887	.....	.08	.06	
260,000	.1964	.....	.09	.06	
170,000	.2050	.....	.09	.06	
280,000	.2130	.....	.09	.06	
290,000	.2220	.....	.09	.06	
300,000	.2305	.....	.10	.07	
10,000	.....	.0100	.06	.08	
310,000	.2405	.....	.10	.07	
315,000	.2450	.....	.10	.07	
320,000	.2498	.....	.10	.07	
325,000	.2545	.....	.10	.07	
330,000	.2590	.....	.10	.07	
335,000	.2638	.....	.10	.07	
340,000	.2685	.....	.10	.07	
345,000	.2735	.....	.10	.07	
350,000	.2790	.....	.10	.07	
10,000	.....	.0204	.09	.08	
355,000	.2848	.....	.11	.07	
360,000	.2900	.....	.11	.07	
365,000	.2960	.....	.11	.07	
370,000	.3020	.....	.11	.06	
375,000	.3095	.....	.11	.05	
380,000	.3175	.....	.11	.05	
385,000	.3250	.....	.11	.04	
390,000	.3330	.....	.11	.03	
395,000	.3452	.....	.12	.02	
400,000	*.3570	.....	.12	.01	
405,000	.....	.....	.14	— .04	
408,000	.....	.....	.15	— .08	Ultimate strength = 33,630 pounds per square inch.

*About.

Failed by deflecting downwards, perpendicular to the plane of the pins, channel A being on the concave side.

Slip of eye-plates along flanges of channel bars, ″.04.

No. 1635.

Tested with pins horizontal, parallel to webs of channel bars.
Length, center to center, of 3½″ pins, 300″ = 25′ 0″.
Gauged length, 260″.
Total weight, including sets of eye plates for pins, perpendicular and parallel to channel-bar webs, 1,926 pounds.
Counter-weight at middle, 913 pounds.
Distance between channel bars, 7″.95.

Sectional area.

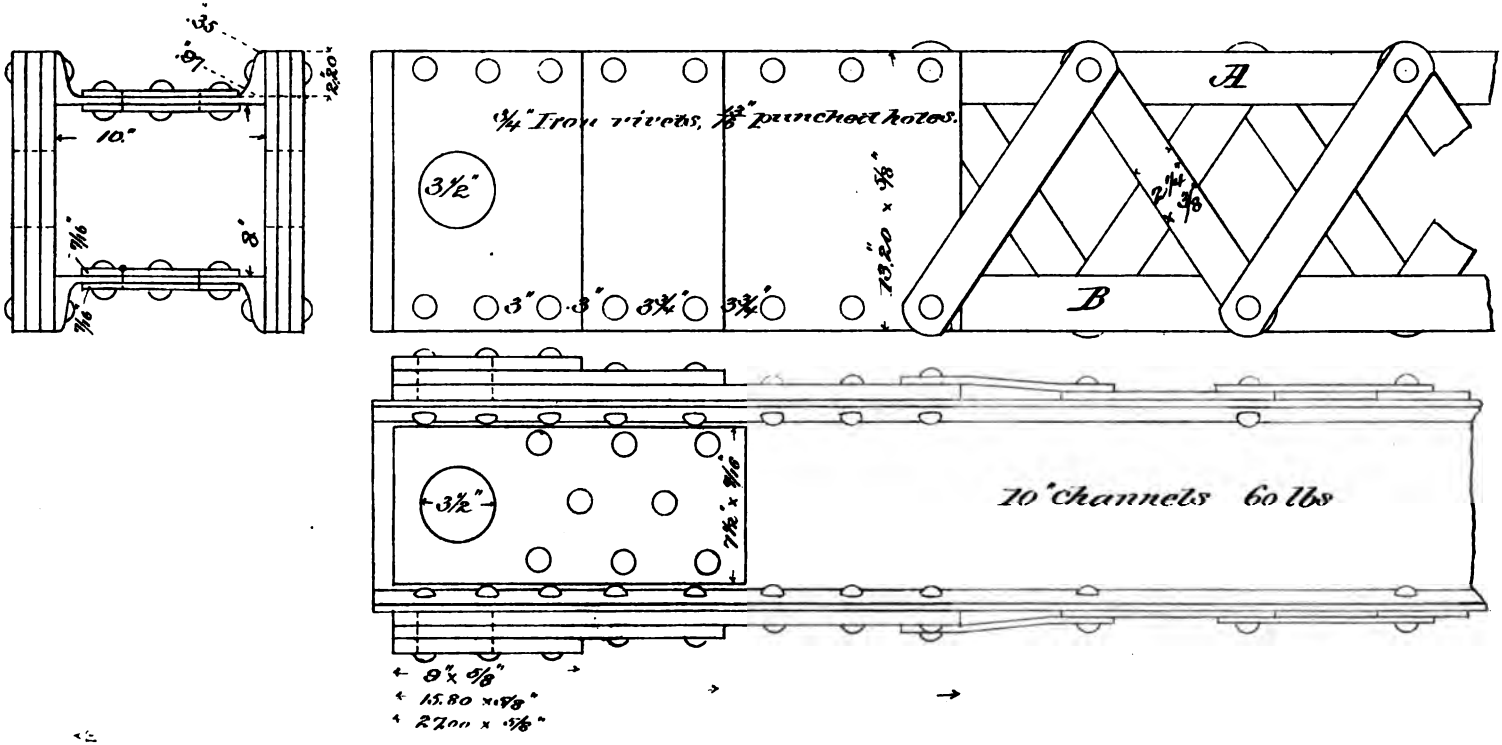
	Square inches.
Channel A, 25′ 8″, 521 pounds; web, ″.33	6.093
Channel B, 25′ 8″, 520 pounds; web, ″.33	6.082
	12.175

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0070	.....	.01	.00½	
30,000	.0147	.....	.03	.01	
40,000	.0220	.....	.05	.01	
50,000	.0290	.....	.05	.01	
60,000	.0374	.....	.05	.01	
70,000	.0450	.....	.05	.01	
80,900	.0523	.....	.05	.02	
90,000	.0595	.....	.05	.02	
100,000	.0675	.....	.05	.02	
10,000	.....	.0008	0.	0.	
110,000	.0750	.....	.04	.03	
120,000	.0823	.....	.04	.03	
130,000	.0900	.....	.04	.03	
140,000	.0978	.....	.04	.03	
150,000	.1050	.....	.04	.04	
160,000	.1125	.....	.04	.04	
170,000	.1200	.....	.04	.05	
180,000	.1280	.....	.04	.05	
190,000	.1350	.....	.04	.05	
200,000	.1430	.....	.04	.05	
10,000	.....	.0024	0.	.01	
210,000	.1510	.....	.04	.06	
220,000	.1580	.....	.04	.07	
230,000	.1658	.....	.04	.07	
240,000	.1734	.....	.04	.07	
250,000	.1811	.....	.04	.08	
260,000	.1890	.....	.04	.08	
270,000	.1970	.....	.04	.08	
280,000	.2047	.....	.04	.09	
290,000	.2125	.....	.04	.09	
300,000	.2214	.....	.04	.10	
10,000	.....	.0074	.02	.03	
310,000	.2297	.....	.05	.10	
320,000	.2378	.....	.05	.11	
330,000	.2473	.....	.06	.12	
340,000	.2562	.....	.07	.13	
350,000	.2655	.....	.07	.14	
360,000	.2745	.....	.08	.16	
10,000	.....	.0170	.05	.06	
370,000	.2850	.....	.09	.19	
380,000	.....	.....	.10	.22	
390,000	.....	.....	.10	.27	
			.11	.36	Ultimate strength = 32,440 pounds per square inch.
395,000	.....	.....	.11	.40	Maximum load slowly increasing vertical deflection. Channel bar A on convex side.
10,000	.....	.....	.10	.21	

Post removed from machine, and pins placed through pin holes provided in webs of channel bars.
Again placed in machine with pins vertical.
Rest between tests, one hour.

Set M (Swelled sides)

General dimensions



S. EX. 5, 1, 48.

No. 1635 *a*.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	.10	.21	
20,000	.....	.....	.10	.20	
50,000	.....	.....	.10	.17	
100,000	.....	.....	.10	.16	
200,000	.....	.....	.10	.16	
300,000	.....	.....	.13	.16	
350,000	.....	.....	.18	.18	
360,000	.....	.....	.19	.21	
370,000	.....	.....	.19	.24	
380,000	.....	.....	.20	.26	
385,000	.....	.....	.23	.26	
390,000	.....	.....	.26	.26	
391,750	.....	.....	.30	.26	
395,000	.....	.....	.35	.26	
396,500	.....	.....	.40	.26	Ultimate strength = 32,570 pounds per square inch.
*394,000	.....	.....	.50	.26	Load sustained when test was discontinued.

*About.

WROUGHT-IRON COLUMNS.

SET M.—10″ *channels latticed, swelled sides.*

No. 1638.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of 3½ pins, 199″.25 = 16′ 7″.25.
Gauged length, 160″.
Total weight (including two sets of eye-plates) 1,549 pounds.
Counter-weight at middle, 750 pounds.
Distance between channel bars at ends, 8″.
Distance between channel bars at middle, 10″.45.
Swell, 2″.45.

Sectional area. Square inches.

Channel A, 17′ 6″, 371 pounds; web, ″.40 ..... 6.363
Channel B, 17′ 6″, 350 pounds; web, ″.32 ..... 6.003

12.366

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0040	.....	0.	0.	
50,000	.0177	.....	.01	.04	
80,000	.0295	.....	.01	.04	
100,000	.0387	.....	.01	.05	
10,000	.....	.0026	.01	.01	
110,000	.0425	.....	.02	.05	
120,000	.0467	.....	.02	.06	
130,000	.0507	.....	.02	.06	
140,000	.0550	.....	.02	.06	
150,000	.0592	.....	.02	.07	
160,000	.0635	.....	.02	.07	
170,000	.0680	.....	.02	.07	
180,000	.0725	.....	.02	.08	
190,000	.0770	.....	.02	.08	
200,000	.0815	.....	.02	.08	
10,000	.....	.0050	.01	.03	
210,000	.0865	.....	.02	.09	
220,000	.0913	.....	.02	.09	
230,000	.0960	.....	.02	.09	

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
240,000	.1010	.....	.02	.09	
250,000	.1061	.....	.02	.09	
260,000	.1120	.....	.02	.09	
270,000	.1179	.....	.02	.09	
280,000	.1230	.....	.03	.09	
290,000	.1298	.....	.03	.09	
300,000	.1360	.....	.03	.09	
10,000	.....	.0190	.02	.02	
310,000	.1430	.....	.03	.09	
320,000	.1475	.....	.04	.09	
330,000	.1530	.....	.04	.09	
340,000	.1603	.....	.04	.09	
350,000	.1690	.....	.05	.10	
360,000	.1760	.....	.05	.11	
370,000	.1859	.....	.07	.16	
375,000	.....	.....	.09	.21	
380,000	.....	.....	.10	.23	
385,000	.....	.....	.10	.30 .34	Ultimate strength = 31,130 pounds per square inch.
Failed by deflecting upward; the heavier channel bar (A) being on the convex side.					
10,000	.....	.....	.10	.24	

Post removed from the testing machine, and pins placed perpendicular to channel-bar webs.

Pins now in vertical position.

Rested between tests half hour.

No. 1638 *a*.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	.10	.24	
100,000	.....	.....	.10	.19	
150,000	.....	.....	.10	.19	
200,000	.....	.....	.10	.20	
250,000	.....	.....	.10	.21	
300,000	.....	.....	.11	.23	
320,000	.....	.....	.12	.25	
340,000	.....	.....	.12	.25	
350,000	.....	.....	.12	.26	
360,000	.....	.....	.12	.26	
370,000	.....	.....	.13	.24	
380,000	.....	.....	.13	.24	
385,000	.....	.....	.13	.23	
390,000	.....	.....	.13	.22	
395,000	.....	.....	.13	.21	
400,000	.....	.....	.13	.20	
405,000	.....	.....	.13	.20	
410,000	.....	.....	.11	.20	
411,000	.....	.....	.11 .12	.27 .40	Ultimate strength = 33,240 pounds per square inch.
10,000	.....	.....	.13	.38	
Rested 15 hours Loads again applied.					
380,000	.....	.....	.12	.40	
400,000	.....	.....	.12	.40	
410,000	.....	.....	.12	.40	
420,000	.....	.....	.12	.40	
430,000	.....	.....	.12	.41	
431,000	.....	.....	.10 .05	.47 .55	Ultimate strength after rest = 34,850 pounds per square inch.
Failed by continuing the upward vertical deflections.					
10,000	.....	.....	.05	.52	

No. 1639.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 199″.50 = 16′ 7.″50.
Gauged length, 160″.
Total-weight, including two sets of eye plates, 1,538 pounds.
Counter-weight at middle, 750 pounds.
Distance between channels at ends, 8″.
Distance between channels at middle, 10″. 45.
Swell, 2.″ 45.

Sectional area.

	Square inches.
Channel A, 17′, 6″, 352 pounds web ″.32	6. 038
Channel B, 17′. 6″, 386 pounds web ″.39	6. 621
	12. 659

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10, 000	0.	.....	0.	0.	
20, 000	.0045	.....	0.	0.	
30, 000	.0090	.....	—.00½	0.	
40, 000	.0140	.....	—.01	0.	
50, 000	.0185	.....	—.01	0.	
60, 000	.0230	.....	—.01	0.	
70, 000	.0280	.....	—.01	0.	
80, 000	.0318	.....	—.02	0.	
90, 000	.0365	.....	—.03	0.	
100, 000	.0415	.....	—.03	0.	
10, 000	.....	.0019	0.	0.	
110, 000	.0468	.....	—.03	0.	
120, 000	.0510	.....	—.03	0.	
130, 000	.0558	.....	—.03	0.	
140, 000	.0605	.....	—.03	—.01	
150, 000	.0657	.....	—.03	—.01	
160, 000	.0700	.....	—.03	—.01	
170, 000	.0751	.....	—.03	—.01	
180, 000	.0800	.....	—.03	—.02	
190, 000	.0850	.....	—.03	—.02	
200, 000	.0897	.....	—.03	—.02	
10, 000	.....	.0027	—.01	0.	
210, 000	.0950	.....	—.03	—.02	
220, 000	.0998	.....	—.04	—.02	
230, 000	.1047	.....	—.05	—.02	
240, 000	.1100	.....	—.05	—.02	
250, 000	.1150	.....	—.05	—.03	
260, 000	.1206	.....	—.05	—.04	
270, 000	.1257	.....	—.05	—.04	
280, 000	.1310	.....	—.06	—.05	
290, 000	.1374	.....	—.06	—.06	
300, 000	.1434	.....	—.06	—.06	
10, 000	.....	.0090	—.02	—.01	
310, 000	.1502	.....	—.07	—.07	
320, 000	.1557	.....	—.07	—.07	
330, 000	.1620	.....	—.07	—.07	
340, 000	.1695	.....	—.07	—.08	
350, 000	.1784	.....	—.07	—.09	
360, 000	.1896	.....	—.08	—.11	
370, 000	.2025	.....	—.09	—.12	
380, 000	.2115	.....	—.10	—.13	
385, 000	.2210	.....	—.10	—.14	
390, 000	.2290	.....	—.10	—.15	
395, 000	.2407	.....	—.11	—.17	
400, 000	.2540	.....	—.12	—.19	
10, 000	.....	.0712	—.10	—.10	
405, 000	.....	.....	—.12 —.14	—.21 —.26	Ultimate strength = 31,990 pounds per square inch.
10, 000	.....	.....	—.11	—.16	

Post removed from testing machine, and pins placed perpendicular to channel-bar webs.
Pins now in a vertical position.
Rested between tests half hour.

No. 1639 a.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	—.11	—.16	
100,000	.....	.....	—.12	—.12	
200,000	.....	.....	—.14	—.12	
300,000	.....	.....	—.16	—.16	
350,000	.....	.....	—.16	—.17	
360,000	.....	.....	—.17	—.18	
370,000	.....	.....	—.17	—.19	
380,000	.....	.....	—.17	—.20	
390,000	.....	.....	—.17	—.20	
400,000	.....	.....	—.18	—.18	
405,000	.....	.....	—.19	—.16	
410,000	.....	.....	—.20	—.14	
415,000	.....	.....	—.25 —.32	—.10 —.08	Ultimate strength = 32,780 pounds per square inch.

Failed by horizontal deflection.

No. 1636.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of 3½ pins, 300″.20 = 25′ 0″.20
Gauged length, 260.″
Total weight, including two sets of eye-plates, 1,951 pounds; counterweight at middle, 913 pounds.
Distance between channel bars: At ends, 7″.95 and 8″.05; at middle, 11″.53.
Swell, 3″.53.

Sectional area.

	Square inches.
Channel A, 25′ 10½″, 508 pounds; web, ″.32	5.890
Channel B, 25′ 10½″, 520 pounds; web, ″.33	6.030
	11.920

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	.0	
20,000	.0080	.....	—.02	.00⅛	
30,000	.0160	.....	—.03	.01	
40,000	.0236	.....	—.03	—.01	
50,000	.0315	.....	—.03	—.01	
60,000	.0398	.....	—.04	—.01	
70,000	.0475	.....	—.05	—.01	
80,000	.0554	.....	—.05	—.01	
90,000	.0632	.....	—.05	—.01	
100,000	.0710	.....	—.06	—.01	
10,000	.....	.0023	—.01	.00⅛	
110,000	.0795	.....	—.06	.00⅛	
120,000	.0870	.....	—.07	0.	
130,000	.0950	.....	—.07	0.	
140,000	.1030	.....	—.07	0.	
150,000	.1110	.....	—.08	0.	
160,000	.1190	.....	—.08	0.	
170,000	.1268	.....	—.08	0.	
180,000	.1350	.....	—.09	—.00⅛	
190,000	.1430	.....	—.09	—.01	
200,000	.1510	.....	—.09	—.01	
10,000	.....	.0050	—.01	+.00⅛	

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
210,000	.1600	.....	—.09	—.01	
220,000	.1682	.....	—.09	—.02	
230,000	.1765	.....	—.10	—.02	
240,000	.1847	.....	—.10	—.03	
250,000	.1937	.....	—.10	—.04	
260,000	.2022	.....	—.10	—.05	
270,000	.2110	.....	—.10	—.06	
280,000	.2200	.....	—.10	—.07	
290,000	.2292	.....	—.11	—.08	
300,000	.2403	.....	—.11	—.09	
10,000	.....	.0167	—.03	—.01	
310,000	.2502	.....	—.11	—.10	
320,000	.2607	.....	—.11	—.11	
330,000	.2726	.....	—.11	—.12	
340,000	.2840	.....	—.11	—.12	
350,000	.2961	.....	—.14	—.16	
360,000	.3132	.....	—.15	—.18	
370,000	.3316	.....	—.17	—.21	
380,000	.3550	.....	—.21	—.25	
390,000	.....	.....	—.30	—.32	
391,400	.....	.....	—.33	—.36	Ultimate strength = 32,830 pounds per square inch.
			—.39	—.45	Maximum deflections.
Post gradually yielding while carrying maximum load.					
10,000	.....	.....	—.26	—.29	

No. 1636 *a*.

Post removed from testing machine and pins placed through pin holes in webs of channel bars. Tested with pins vertical.
Rested between tests half hour.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	—.26	—.29	
50,000	.....	.....	—.29	—.29	
100,000	.....	.....	—.32	—.20	
200,000	.....	.....	—.44	—.22	
300,000	.....	.....	—.60	—.27	
310,000	.....	.....	—.62	—.27	
320,000	.....	.....	—.66	—.28	
330,050	.....	.....	—.67	—.28	
340,000	.....	.....	—.76	—.28	
345,000	.....	.....	—.86	—.28	
346,000	.....	.....	—.92	—.28	Ultimate strength = 29,080 pounds per square inch.
Loads continued gradually increasing the horizontal deflection. Loads and deflections recorded as the pressure fell.					
280,000	.....	.....	—2.30	.....	
268,000	.....	.....	—2.54	—.24	
268,000	.....	.....	—2.68	—.24	
10,000	.....	.....	—1.40	—.24	
Rested 15 hours. Loads again applied.					
268,000	.....	.....	—.2.64	—.24	
273,000	.....	.....	—.2.68	—.24	
275,200	.....	.....	—.2.79	.....	Ultimate strength = 23,070 pounds per square inch.
250,000	.....	.....	—.3.50	.....	
Loads continued till this deflection was reached. The deflections increasing gradually, without sudden springing of the post.					

No. 1637.

(Tested with pins horizontal, parallel to webs of channel bars.)

Length, center to center, of 3½″ pins, 300″.15 = 25′ 0.″15.
Gauged length, 260.″
Total weight (including two sets of eye-plates), 1,962 pounds; counterweight at middle, 913 pounds.
Distance between channels at ends, 8″.
Distance between channels at middle, 11″.60.
Swell, 3.″60.

Sectional area.

	Square inches
Channel A, 25′ 10″, 516 pounds; web, .″32	5.993
Channel B, 25′ 10½″, 512 pounds; web, .″32	5.939
	11.932

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0078	.....	0.	0.	
30,000	.0157	.....	0.	0.	
40,000	.0230	.....	.00½	0.	
50,000	.0310	.....	.00½	0.	
60,000	.0385	.....	.01	0.	
70,000	.0461	.....	.01	0.	
80,000	.0540	.....	.01	0.	
90,000	.0618	.....	.01	0.	
100,000	.0695	.....	.01	0.	
10,000	.....	.0022	0.	0.	
110,000	.0777	.....	.01	0.	
120,000	.0850	.....	.01	0.	
130,000	.0929	.....	.01	0.	
140,000	.1008	.....	.01	0.	
150,000	.1082	.....	.01	0.	
160,000	.1162	.....	.01	0.	
170,000	.1238	.....	.01	0.	
180,000	.1317	.....	.01	0.	
190,000	.1398	.....	.01	0.	
200,000	.1470	.....	.01	0.	
10,000	.....	.0041	0.	0.	
210,000	.1550	.....	.01	0.	
220,000	.1630	.....	.01	.00½	
230,000	.1707	.....	.02	.01	
240,000	.1785	.....	.02	.01	
250,000	.1863	.....	.03	.02	
260,000	.1940	.....	.04	.03	
270,000	.2022	.....	.05	.04	
280,000	.2098	.....	.05	.04	
290,000	.2180	.....	.06	.04	
300,000	.2263	.....	.07	.04	
10,000	.....	.0081	.02	.02	
310,000	.2360	.....	.08	.05	
320,000	.2438	.....	.09	.05	
330,000	.2525	.....	.10	.05	
340,000	.2622	.....	.10	.05	
350,000	.2720	.....	.12	.07	
360,000	.2824	.....	.13	.08	
370,000	.2934	.....	.15	.10	
380,000	.3050	.....	.20	.12	
390,000	.3240	.....	.33	.21	
390,700	.....	.....	.36 .40	..... .28	Ultimate strength = 32,740 pounds per square inch.
Deflections gradually increasing while carrying the maximum load.					
10,000	.....	.....	.30	.21	

Deflection.

No. 1637*a*.

Post removed from the testing machine and pins placed through pin holes in webs of channel bars, bringing pins into vertical position.
Rested between tests one-half an hour.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	.....	.30	.21	
100,000	.....	.....	.34	.19	
200,000	.....	.....	.42	.19	
250,000	.....	.....	.48	.19	
300,000	.....	.....	.55	.19	
320,000	.....	.....	.60	.19	
330,000	.....	.....	.64	.21	
340,000	.....	.....	.68	.22	
350,000	.....	.....	.71	.22	
350,000	.....	.....	.....	.....	Ultimate strength = 29,330 pounds per square inch.
*250,000	.....	.....	3.50	.22	Load sustained under deflection, as here shown.

*About.

WROUGHT-IRON COLUMNS.

SET N.—10″ *channels latticed one side—continuous plate one side.*

No. 1630.

Pins in center of gravity of channel bars and continuous plate; 1″.63 from center line of channel bars.
Length, center to center, of 3½″ pins, 300″=25′ 0″.
Gauged length, 260″.
Total weight, 1,848 pounds.
Counter-weight at middle, 924 pounds.

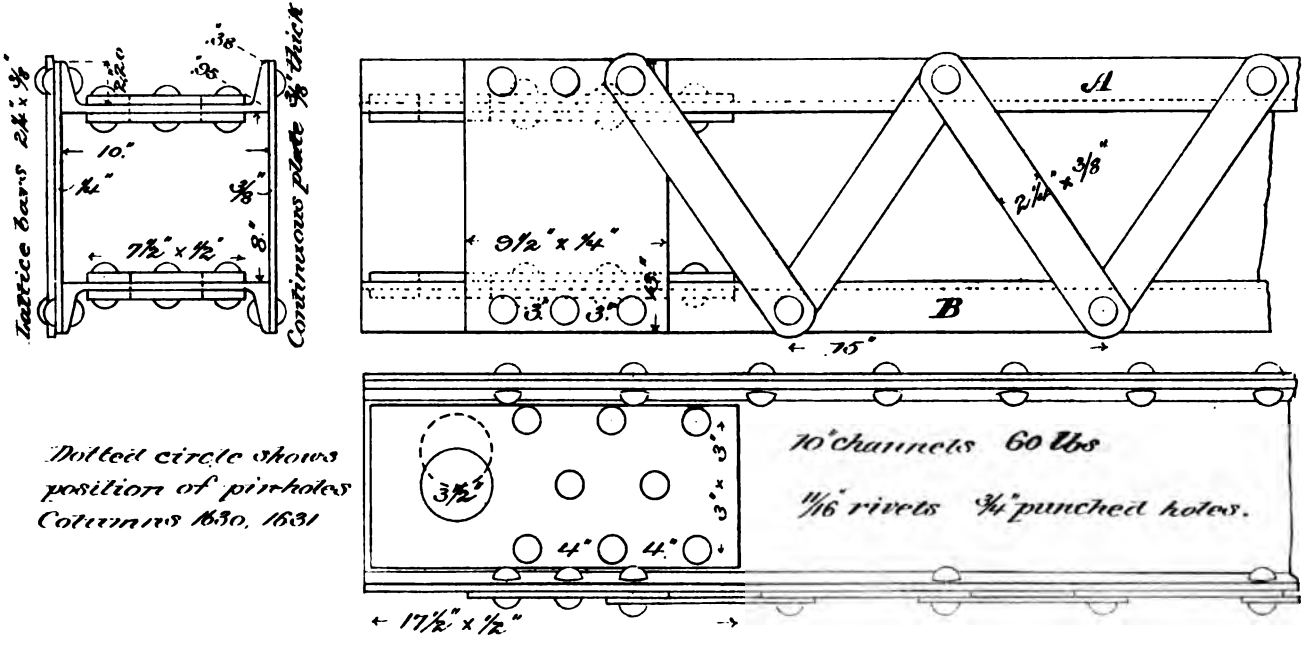
Sectional area.

	Square inches.
Channel A, 25′ 8½″, 521 pounds; web ″.33	6.086
Channel B, 25′ 8½″, 521 pounds; web ″.33	6.086
Plate (13″ × ″.43), 25′ 8½″, 467 pounds	5.450
	17.622

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0065	.....	0.	0.	
30,000	.0138	.....	0.	—.01	
40,000	.0209	.....	0.	—.02	
50,000	.0272	.....	0.	—.04	
60,000	.0329	.....	0.	—.05	
70,000	.0383	.....	0.	—.05	
80,000	.0437	.....	0.	—.05	
90,000	.0491	.....	.01	—.05	
100,000	.0544	.....	.01	—.05	
10,000	.....	.0005	0.	0.	
110,000	.0595	.....	.02	—.05	
120,000	.0650	.....	.02	—.05	
130,000	.0705	.....	.02	—.05	
140,000	.0758	.....	.03	—.05	
150,000	.0810	.....	.03	—.05	
160,000	.0865	.....	.04	—.05	
170,000	.0916	.....	.04	—.05	
180,000	.0907	.....	.04½	—.05	

Set N

General dimensions



Dotted circle shows position of pinholes Columns 1630, 1631

S. EX. 5 , 1, 48.

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
190,000	.1022	.....	.04½	—.05	
200,000	.1075	.....	.05	—.05	
10,000	.....	.0015	0.	.00½	
220,000	.1176	.....	.06	—.04	
230,000	.1230	.....	.06	—.04	
240,000	.1281	.....	.07	—.04	
250,000	.1333	.....	.08	—.04	
260,000	.1390	.....	.09	—.04	
270,000	.1440	.....	.10	—.04	
280,000	.1490	.....	.10	—.03	
290,000	.1540	.....	.11	—.03	
300,000	.1592	.....	.12	—.03	
10,000	.....	.0035	.02	.00½	
310,000	.1640	.....	.13	—.02	
320,000	.1690	.....	.14	—.02	
330,000	.1740	.....	.16	—.02	
340,000	.1790	.....	.18	—.01	
350,000	.1832	.....	.20	0.	
360,000	.1880	.....	.21	0.	
370,000	.1921	.....	.24	0.	
380,000	.1970	.....	.27	.02	
390,000	.2010	.....	.31	.06	
400,000	.2050	.....	.34	.04	
10,000	.....	.0050	.12	.03	
405,000	.....	.....	.39	.03	
410,000	.....	.....	.41	.03	
415,000	.....	.....	.44	.03	
420,000	.....	.....	.47	.03	
424,000	.....	.....	.50	.02	
425,000	.....	.....	.53	.02	
430,000	.....	.....	.55	.02	
435,000	.....	.....	.59	.02	
440,000	.....	.....	.62	.02	
445,000	.....	.....	.69	.02	Snapping sounds.
450,000	.....	.....	.79	.02	
455,000	.....	.....	.89	.02	
460,000	.....	.....	.98	.....	
461,500	.....	.....	1.19	.....	Ultimate strength = 26,190 pounds per square inch.
			1.35	.....	Sustained maximum load till this deflection was reached, then gradually yielded by horizontal deflection.
440,000	.....	.....	1.94	.....	Sustains this load without farther deflection.
10,000	.....	.....	.88	.02	Rested fifteen hours. Loads again applied.
444,000	.....	.....	1.94	.....	Load required to produce the same deflection post had before resting.
452,000	.....	.....	2.08	.....	Maximum load sustained after above deflections.

Pin holes in ½″ eye-plates elongated, 4.0″.
Pin holes in webs of channels elongated, ″.11.
Eye-plates slipped ″.07 each, along webs of the channels.
Post deflected concave on the side having the ″.43 plate, convex on latticed side.

No. 1631.

Pins in center of gravity of channel bars and continuous plate, 1″.54 from center line of channel bars.
Length, center to center, of 3½″ pins, 300″=25′ 0″.
Gauged length, 260.″
Total weight, 1,827 pounds.
Counter-weight at middle, 913 pounds.

Sectional area.	Square inches.
Channel A, 25′ 8½″, 519 pounds; web ″.33	6.063
Channel B, 25′ 8½″, 525 pounds; web ″.33	6.122
Side plate (13″×″.40), 25′ 8½″, 432 pounds	5.046
	17.231

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0083	.....	0.	—.01	
30,000	.0150	.....	0.	—.01	
40,000	.0209	.....	0.	—.01	
50,000	.0260	.....	0.	—.01	
60,000	.0318	.....	0.	—.01	
70,000	.0374	.....	0.	0.	
80,000	.0428	.....	0.	0.	
90,000	.0480	.....	0.	0.	
100,000	.0535	.....	0.	0.	
10,000	.....	—.0005	0.	.03	
110,000	.0586	.....	0.	0.	
120,000	.0640	.....	0.	0.	
130,000	.0694	.....	0.	0	
140,000	.0749	.....	0.	0.	
150,000	.0805	.....	0.	0.	
160,000	.0857	.....	0.	0.	
170,000	.0912	.....	0.	0.	
180,000	.0965	.....	0.	0.	
190,000	.1020	.....	0.	0.	
200,000	.1075	.....	0.	0.	
10,000	.....	—.0003	—.01	.05	
210,000	.1125	.....	0.	0.	
220,000	.1180	.....	0.	.01	
230,000	.1234	.....	0.	.01	
240,000	.1290	.....	.00½	.01	
250,000	.1342	.....	.00½	.01	
260,000	.1395	.....	.01	.01	
270,000	.1448	.....	.01	.01	
280,000	.1500	.....	.01	.01	
290,000	.1553	.....	.02	.01	
300,000	.1602	.....	.08	.02	
10,000	.....	.0006	0.	.06	
310,000	.1655	.....	.04	.02	
320,000	.1710	.....	.04	.03	
330,000	.1765	.....	.05	.03	
340,000	.1816	.....	.06	.03	
350,000	.1873	.....	.06	.03	
360,000	.1928	.....	.07	.03	
370,000	.1984	.....	.08	.03	
380,000	.2040	.....	.09	.03	
390,000	.2092	.....	.11	.03	
400,000	.2150	.....	.13	.03	
10,000	.....	.0080	.04	.06	
410,000	.2204	.....	.16	.03	
420,000	.2260	.....	.20	.02	
430,000	.2315	.....	.23	.02	
440,000	.2368	.....	.26	.02	
450,000	.2422	.....	.32	.02	
460,000	.....	.....	.42	.01	
465,000	.....	.....	.50	.01	
470,000	.....	.....	.57	.01	
475,000	.....	.....	.65	.01	
480,000	.....	.....	.82	.01	
485,000	.....	.....	.92	.01	Ultimate strength = 28,150 pounds per square inch.
			1.25	.01	Sustained maximum load five minutes, increasing deflection to 1".25.
10,000	.....	.....	.49	.07	Rested one hour,
Loads applied after resting one hour.					
485,000	.....	.....	.....	.....	Continues the horizontal deflection from 1".28 horizontal to 1".60 vertical; test then discontinued.

Post failed in the same manner as No. 1630; the continuous plate being on the concave side.

Pin holes in eye-plates elongated ".04.

Pin holes in channel bars elongated ".11.

Slip of eye-plates, ".07.

No. 1632.

(Pins placed in center of gravity of channel bars.)

Length, center to center, of pins, 300″ = 25′ 0″.
Gauged length, 260″.
Total weight, 1,845 pounds.
Counter-weight at middle, 922 pounds.

Sectional area.

	Square inches
Channel A, 25′ 8½″, 526 pounds; web, ″.33	6.145
Channel B, 25′ 8½″, 511 pounds; web, ″.32	5.958
Side plate (13″ × ″.44), 25′ 8½″, 468 pounds	5.467
	17.570

Loads applied.	Compression.	Compression sets.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0030	.....	— .01	.02	
30,000	.0080	.....	— .04	.05	
40,000	.0137	.....	— .08	.06	
50,000	.0196	.....	— .10	.06	
60,000	.0257	.....	— .12	.06	
70,000	.0316	.....	— .14	.06	
80,000	.0380	.....	— .17	.07	
90,000	.0445	.....	— .20	.07	
100,000	.0506	.....	— .22	.07	
10,000	.....	.0005	0.	0.	
110,000	.0570	.....	— .25	.07	
120,000	.0635	.....	— .28	.07	
130,000	.0700	.....	— .30	.07	
140,000	.0763	.....	— .33	.07	
150,000	.0828	.....	— .36	.07	
160,000	.0897	.....	— .39	.08	
170,000	.0965	.....	— .43	.08	
180,000	.1030	.....	— .47	.08	
190,000	.1100	.....	— .50	.08	
200,000	.1171	.....	— .54	.08	
10,000	.....	.0020	— .01	.01	
210,000	.1248	.....	— .59	.08	
220,000	.1348	.....	— .63	07	
230,000	.1393	.....	— .67	.07	
240,000	.1470	.....	— .71	.07	
250,000	.1547	.....	— .77	.07	
260,000	.1630	.....	— .82	.07	
270,000	.1711	.....	— .88	.07	
280,000	.1798	.....	— .95	.07	
290,000	.1895	.....	—1.04	.07	
300,000	.2005	.....	—1.15	.07	
10,000	.....	.0130	— .15	.03	
305,000	.....	.....	—1.33	.07	
306,000	.....	.....	—1.50	.....	Ultimate strength = 17,420 pounds per square inch.
.....	.....	.....	—1.80	.....	Sustained maximum load while horizontal deflection increased from 1.50 inch to 1.80 inch.
260,000	.....	.....	—3.00	.19	Load sustained, when deflected, as here shown.

Post deflected convex on the side of the continuous plate.
Pin holes not disturbed.

No. 1633.

(Pins placed in center of gravity of channel bars.)

Length, center to center, of pins, 300″ = 25′ 0″.
Gauged length, 260″.
Total weight, 1,827 pounds.
Counter-weight at middle, 913 pounds.

Sectional area.

	Square inches.
Channel A, 25′ 8½″, 522 pounds; web, ″.33	6.098
Channel B, 25′ 8½″, 524 pounds; web, ″.33	6.121
Side plate (13.″ × ″.44) 25′ 8½″, 471 pounds	5.502
	17.721

Loads applied.	Compression.	Compression sets.	Deflections.		Remarks.
			Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	.....	0.	0.	
20,000	.0084	.....	−.01	−.03	
30,000	.0173	.....	−.04	−.06	
40,000	.0250	.....	−.07	−.07	
50,000	.0314	.....	−.09	−.08	
60,000	.0377	.....	−.11	−.08	
70,000	.0443	.....	−.13	−.09	
80,000	.0557	.....	−.16	−.09	
90,000	.0570	.....	−.18	−.09	
100,000	.0632	.....	−.21	−.09	
10,000	.....	.0008	0	−.08	
110.000	.0700	.....	−.24	−.10	
120,000	.0760	.....	−.27	−.10	
130,000	.0820	.....	−.30	−.10	
140,000	.0885	.....	−.32	−.11	
150,000	.0950	.....	−.35	−.11	
160,000	.1015	.....	−.39	−.11	
170.000	.1080	.....	−.41	−.12	
180,000	.1142	.....	−.45	−.12	
190,000	.1210	.....	−.48	−.12	
200,000	.1278	.....	−.51	−.12	
10,000	.....	.0020	−.01	−.05	
210,000	.1347	.....	−.56	−.13	
220,000	.1415	.....	−.60	−.13	
230,000	.1487	.....	−.64	.....	
240,000	.1554	.....	−.69	.....	
250,000	.1629	.....	−.74	.....	
260,000	.1704	.....	−.80	.....	
270,000	.1785	.....	−.85	−.14	
280,000	.....	.....	−.91	−.15	
290,000	.....	.....	−1.00	−.16	
295,000	.....	.....	−1.11	−.17	
300,000	.....	.....	−1.20	−.17	
305,000	.....	.....	−1.29	−.17	
307,000	.....	.....	−1.38	−.18	Ultimate strength = 17,270 pounds per square inch.
			−1.70	.....	Sustained maximum load five minutes, increasing deflection from −1.38 inch −1.70 inch.

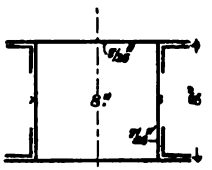
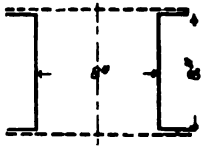
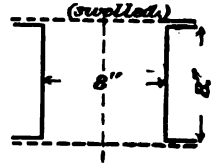
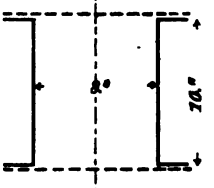
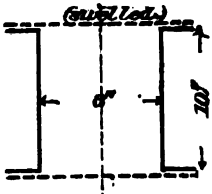
Post deflected convex on the side of the continuous plate.

4 b.

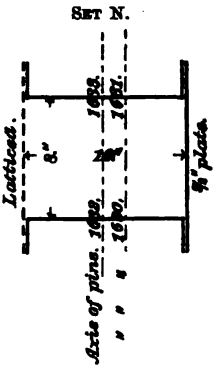
TABULATION OF EXPERIMENTS ON WROUGHT-IRON COLUMNS WITH 3¼-INCH PIN ENDS.

No. of test.	Style of column.	Length, center to center of pins.	Sectional area.	Ultimate strength.		Manner of failure.
				Total pounds.	Pounds per sq. inch.	
	SET A.					
		Inches.	*Square inches.*			
752		120.20	9.831	297,160	30,220	Deflected perpendicular to axis of pins.
757		120.07	10.199	320,000	31,380	Sheared rivets in eye-plates.
755		180.00	9.977	251,000	25,160	Deflected perpendicular to axis of pins.
756		180.00	9.977	210,000	21,050	Do.
753		240.00	9.732	188,600	19,380	Do.
754		240.10	9.762	158,300	16,220	Do.
	SET D.					
751		240.00	16.077	425,000	26,430	Deflected perpendicular to axis of pins.
1642		240.00	16.281	367,000	22,540	Do.
1646		320.00	16.179	318,800	19,700	Do.
1647		320.10	16.141	283,600	17,570	Do.
	SET E.					
1653		320.00	17.898	474,000	26,480	Deflected perpendicular to axis of pins.
1654		320.00	19.417	491,000	25,290	Do.
	SET F.					
1645		319.95	16.168	453,000	28,020	Deflected parallel to axis of pins.
1650		320.00	16.267	454,000	27,910	Deflected perpendicular to axis of pins.

Tabulation of experiments on wrought-iron columns, &c.—Continued.

No. of test.	Style of column.	Length, center to center of pins.	Sectional area.	Ultimate strength.		Manner of failure.
				Total pounds.	Pounds per sq. inch.	
	SET G.					
1651		320.00	20.954	540,000	25,770	Deflected in diagonal direction.
1652		320.10	20.613	535,000	25,950	Sheared rivets in eye-plates.
	SET H.					
746		159.20	7.628	258,700	33,910	Deflected perpendicular to axis of pins.
747		159.27	8.056	294,700	36,580	Do.
748		239.60	7.621	260,000	34,120	Do.
749		239.60	7.621	254,600	33,410	Deflected in diagonal direction.
1648		319.90	7.705	243,600	31,610	Deflected parallel to axis of pins.
1649		319.85	7.673	229,200	29,870	Deflected in diagonal direction.
	SET I. (Grooved.)					
740		159.90	7.645	262,500	34,340	Deflected perpendicular to axis of pins.
741		159.90	7.624	255,650	33,530	Do.
739		239.70	7.517	251,000	33,390	Deflected parallel to axis of pins.
750		239.70	7.531	259,000	34,390	Deflected perpendicular to axis of pins.
1643		319.80	7.691	237,200	30,840	Deflected parallel to axis of pins.
1644		319.92	7.702	237,000	30,770	Deflected in diagonal direction.
	SET L.					
1640		199.84	11.944	403,000	33,740	Deflected perpendicular to axis of pins.
1641		200.00	12.302	426,500	34,670	Deflected in diagonal direction.
1634		300.00	12.148	408,000	33,630	Deflected perpendicular to axis of pins.
1635		300.00	12.175	395,000	32,440	Do.
	SET M. (Grooved.)					
1638		199.25	12.366	385,000	31,130	Deflected perpendicular to axis of pins.
1639		199.50	12.659	405,000	31,990	Do.
1636		300.20	11.920	391,400	32,830	Deflected in diagonal direction.
1637		300.15	11.932	390,700	32,740	Do.

Tabulation of experiments on wrought-iron columns, &c.—Continued.

No. of test.	Style of column.	Length, center to center of pins.	Sectional area.	Ultimate strength.		Manner of failure.
				Total pounds.	Pounds per sq. inch.	
	SET N. 					
1630		300.00	17.622	461,500	26,190	Deflected perpendicular to axis of pins.
1631		300.00	17.231	485,000	28,150	Do.
1632		300.00	17.570	306,000	17,420	Do.
1633		300.00	17.721	307,000	17,270	Do.

5.

TESTS BY TENSION AND COMPRESSION OF COLD-SWAGED AND COLD-ROLLED STEEL BARS.

[Specimens furnished by the Ordnance Bureau, Navy Department.]

Description of the manner of testing.

The compression specimens were tested between fixtures supplied by Dr. W. E. Woodbridge or the Navy Department, received at this arsenal with the specimens to be tested.

The fixtures consisted of a cylindrical hardened steel buttress, which was placed between the specimen and the south platform of the testing machine. Also a cushion for equalizing the pressure which was employed next the north platform of the testing machine.

The equalizing cushion was composed of four parts, viz: a base plate recessed to receive, and provided with an india-rubber disk; a brass check to prevent the escape of rubber, and a thin hardened steel disk.

For determining the elastic and permanent compression of the specimens a plunger gauge was introduced in the bore of each.

The gauge was telescopic, and shortened, as loads were applied, by contact with the hardened disk and buttress.

The tensile specimens were tested in the usual manner.

They were secured by their square ends in the hydraulic holder jaws of the testing machine.

Elongations were measured by means of a micrometer screw with extension rods, covering a specimen length of 20 inches.

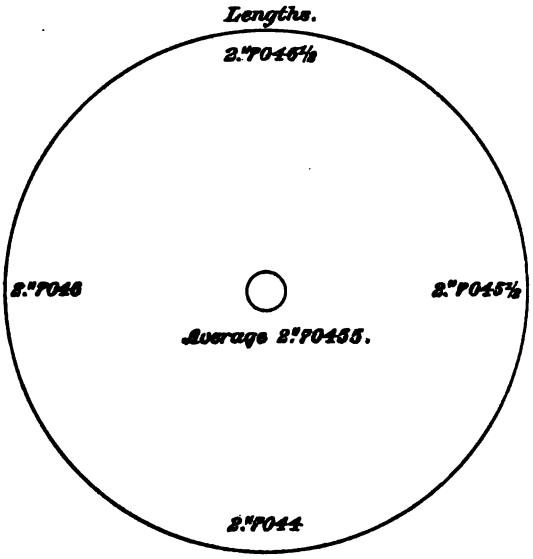
This instrument was clamped to the specimen, and remained in position till near the close of the test, when removed to avoid injury upon the fracturing of the bar.

The cold-swaged bars were cast and forged by the Midvale Steel Company, annealed and cold swaged at the Washington navy-yard.

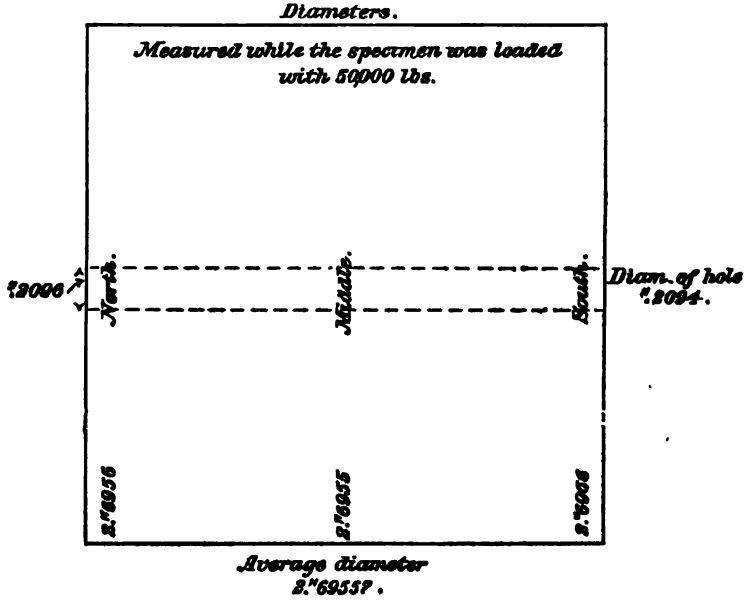
The cold-rolled bars were cast and forged by the Otis Steel Company, annealed at the Washington navy-yard, and cold rolled by Jones & Laughlin.

No. 4422.

Compression of specimen from cold swaged bar.

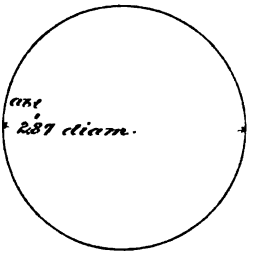


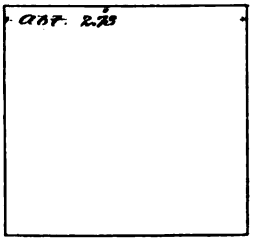
Length of specimen determined with plunger gauge 2".7046.



Sectional area, 5.6723 square inches.

Pictures employed in making th





Hardened Buttress.

S. EX. 5 ., 1, 48.

Loads applied.	Length of specimen.	Compression.	Diameters.			Remarks.
			North.	Middle.	South.	
Pounds.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	
0	2.7046		2.6961	2.6958	2.6958	These diameters were measured in different positions from the following determinations.
10,000	2.7045	.0001				
20,000	2.7043½					
30,000	2.7041 +					
40,000	2.7040					
50,000	2.7038		2.6956	2.6955	2.6956	
0	2.7051					
0	2.7051 +					
60,000	2.7036½		2.6956	2.6955	2.6955	
0	2.7050					
70,000	2.7035 +		2.6956	2.6955	2.6955	
0	2.7051					
80,000	2.7034		2.6956	2.6956	2.6955	
0	2.7050					
90,000	2.7032½		2.6956	2.6956	2.6955	
0	2.7049 −					
0	2.7049 −					After 17 hours' rest.
100,000	2.7028		2.6956	2.6956	2.6955	
0	2.7048 −					
110,000	2.7026 +		2.6957	2.6956+	2.6955+	
0	2.7049					
120,000	2.7025		2.6959	2.6957+	2.6957	
0	2.7049 +					
130,000	2.7025		2.6960	2.6957	2.6958−	
0	2.7049					
140,000	2.7022 +		2.6961	2.6957+	2.6958−	
0	2.7048					
150,000	2.7022		2.6961+	2.6960	2.6958+	
0	2.7049 −					
160,000	2.7020 −		2.6961+	2.6960+	2.6960	
0	2.7049					
170,000	2.7019 −		2.6962	2.6962	2.6961−	
0	2.7050 +					
0	2.7050 +					
180,000	2.7016 +		2.6962	2.6962	2.6960	
0	2.7050 −					
190,000	2.7015		2.6963	2.6963+	2.6961	
0	2.7050 +					
200,000	2.7012 +		2.6963	2.6963+	2.6961	
0	2.7050 +					
210,000	2.7012 +		2.6963+	2.6963+	2.6962+	
0	2.7052					
220,000	2.7010 −		2.6964	2.6964	2.6963	
0	2.7051					After resting for forty-four hours, disk next brass check reversed in position; surface of which was not clean, possibly affecting measurements of length.
0	2.7055					
0	2.7055					
230,000	2.7010 −		2.6964	2.6964	2.6962+	
0	2.7054					
240,000	2.7007 +		2.6964+	2.6964	2.6963	
0	2.7054					
250,000	2.7006		2.6964+	2.6964+	2.6963	
0	2.7053 +					
260,000	2.7004 +		2.6964+	2.6964+	2.6963+	
0	2.7039					
0	2.7053 +					
270,000	2.7002 +		2.6965	2.6965	2.6964+	
0	2.7054					
280,000	2.7000		2.6965	2.6965	2.6964+	
0	2.7055					
290,000	2.6998		2.6965	2.6965−	2.6965	
0	2.7056 +					
300,000	2.6996 +		2.6965	2.6964	2.6965	
0	2.7056					

Up to the present readings, all lengths have been measured from the plunger gauge in bore of specimen. Measuring the lengths on the specimen itself when removed from the machine, gives the following results:

Lengths at circumference: 2.7041+, 2″.7042, 2″.7043, 2″.7039; average, 2″.7041+; length at center near bore, 2″.7041.

The compression plunger in contact with south end of specimen examined and found concave about ″.001+. Before the test this plunger had a nearly flat face.

Loads applied.	Length of specimen.	Compression.	Diameters.			Remarks.
			North.	Middle.	South.	
Pounds.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	
0	2.7046	.....	2.6961	2.6953	2.6958	These diameters were measured in different positions from the following determinations.
10,000	2.7045	.0001	.....	.....	.....	
20,000	2.7043½	.....	.....	.....	.....	
30,000	2.7041 +	.....	.....	.....	.....	
40,000	2.7040	.....	.....	.....	.....	
50,000	2.7038	.....	2.6956	2.6955	2.6956	
0	2.7051	.....	.....	.....	.....	
0	2.7051 +	.....	.....	.....	.....	
60,000	2.7036½	.....	2.6956	2.6955	2.6955	
0	2.7050	.....	.....	.....	.....	
70,000	2.7035 +	.....	2.6956	2.6955	2.6955	
0	2.7051	.....	.....	.....	.....	
80,000	2.7034	.....	2.6956	2.6956	2.6955	
0	2.7050	.....	.....	.....	.....	
90,000	2.7032½	.....	2.6956	2.6956	2.6955	
0	2.7049 −	.....	.....	.....	.....	
0	2.7049 −	.....	.....	.....	.....	After 17 hours' rest.
100,000	2.7028	.....	2.6956	2.6956	2.6955	
0	2.7048 −	.....	.....	.....	.....	
110,000	2.7026 +	.....	2.6957	2.6956+	2.6955+	
0	2.7049	.....	.....	.....	.....	
120,000	2.7025	.....	2.6959	2.6957+	2.6957	
0	2.7049 +	.....	.....	.....	.....	
130,000	2.7025	.....	2.6960	2.6957	2.6958−	
0	2.7049	.....	.....	.....	.....	
140,000	2.7022 +	.....	2.6961	2.6957+	2.6958−	
0	2.7048	.....	.....	.....	.....	
150,000	2.7022	.....	2.6961+	2.6960	2.6958+	
0	2.7049 −	.....	.....	.....	.....	
160,000	2.7020 −	.....	2.6961+	2.6960+	2.6960	
0	2.7049	.....	.....	.....	.....	
170,000	2.7019 −	.....	2.6962	2.6962	2.6961−	
0	2.7050 +	.....	.....	.....	.....	
0	2.7050 +	.....	.....	.....	.....	
180,000	2.7016 +	.....	2.6962	2.6962	2.6960	
0	2.7050 −	.....	.....	.....	.....	
190,000	2.7015	.....	2.6963	2.6963+	2.6961	
0	2.7050 +	.....	.....	.....	.....	
200,000	2.7012 +	.....	2.6963	2.6963+	2.6961	
0	2.7050 +	.....	.....	.....	.....	
210,000	2.7012 +	.....	2.6963+	2.6963+	2.6962+	
0	2.7052	.....	.....	.....	.....	
220,000	2.7010 −	.....	2.6964	2.6964	2.6963	
0	2.7051	.....	.....	.....	.....	After resting for forty-four hours, disk next brass check reversed in position; surface of which was not clean, possibly affecting measurements of length.
0	2.7055	.....	.....	.....	.....	
0	2.7055	.....	.....	.....	.....	
230,000	2.7010 −	.....	2.6964	2.6964	2.6962+	
0	2.7054	.....	.....	.....	.....	
240,000	2.7007 +	.....	2.6964+	2.6964	2.6963	
0	2.7054	.....	.....	.....	.....	
250,000	2.7006	.....	2.6964+	2.6964+	2.6963	
0	2.7053 +	.....	.....	.....	.....	
260,000	2.7004 +	.....	2.6964+	2.6964+	2.6963+	
0	2.7039	.....	.....	.....	.....	
0	2.7053 +	.....	.....	.....	.....	
270,000	2.7002 +	.....	2.6965	2.6965	2.6964+	
0	2.7054	.....	.....	.....	.....	
280,000	2.7000	.....	2.6965	2.6965	2.6964+	
0	2.7055	.....	.....	.....	.....	
290,000	2.6998	.....	2.6965	2.6965−	2.6965	
0	2.7056 +	.....	.....	.....	.....	
300,000	2.6996 +	.....	2.6965	2.6964	2.6965	
0	2.7056	.....	.....	.....	.....	

Up to the present readings, all lengths have been measured from the plunger gauge in bore of specimen. Measuring the lengths on the specimen itself when removed from the machine, gives the following results:

Lengths at circumference: 2.7041+, 2″.7042, 2″.7043, 2″.7039; average, 2″.7041+; length at center near bore, 2″.7041.

The compression plunger in contact with south end of specimen examined and found concave about ″.001+. Before the test this plunger had a nearly flat face.

Loads applied.	Length of specimen plunger gauge measurement.	Length measured on specimen near center.	Diameters.			Remarks.
			North.	Middle.	South.	
Pounds.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	
310,000	2.6993	.....	2.6966+	2.6966−	2.6966+	Test resumed after fifteen hours' rest.
0	2.7059	2.7041	.....	.....	.....	
320,000	2.6991+	.....	2.6966+	2.6966−	2.6966+	
0	2.7056	2.7040	.....	.....	.....	
330,000	2.6989	.....	2.6967	2.6966	2.6967	
0	2.7059+	2.7040+	.....	.....	.....	
340,000	2.6986	.....	2.6967	2.6966	2.6968	
0	2.7059+	2.7039+	.....	.....	.....	
350,000	2.6985	.....	2.6969	2.6966−	2.6970	
0	2.7058	2.7038	.....	.....	.....	
360,000	2.6984−	.....	2.6969+	2.6966+	2.6971	
0	2.7058	2.7037	.....	.....	.....	
370,000	2.6982	.....	2.6970	2.6966	2.6974	
0	2.7058+	2.7038	.....	.....	.....	
380,000	2.6977−	.....	2.6970	2.6966	2.6976	
0	.....	2.7037	.....	.....	.....	
390,000	2.6973+	.....	2.6972	2.6967	2.6981+	
0	.....	2.7036+	.....	.....	.....	
400,000	2.6970	.....	2.6972	2.6968−	2.6981	
0	2.7055	2.7036	.....	.....	.....	
410,000	2.6966+	.....	2.6974	2.6970	2.6986	
0	2.7055	2.7035	.....	.....	.....	
420,000	2.6963+	.....	2.6976	2.6974−	2.6993	
0	2.7053+	2.7034	.....	.....	.....	
430,000	2.6957	.....	2.6977	2.6974−	2.6992+	
0	2.7051	2.7033	.....	.....	.....	Rested fourteen hours.
440,000	2.6956	.....	2.6981	2.6976	2.7000	
0	.....	2.7033−	.....	.....	.....	
450,000	2.6944−	.....	2.6985+	2.6977	2.7006	
0	2.7046	2.7028	.....	.....	.....	Lengths at circumference: 2″.7026, 2″.7025, 2″.6996, 2″.6979; average, 2″.7006+.

Test discontinued.

Specimen convex on south end, as shown by lengths measured at circumference and central length. Also bent concave on side showing least length.

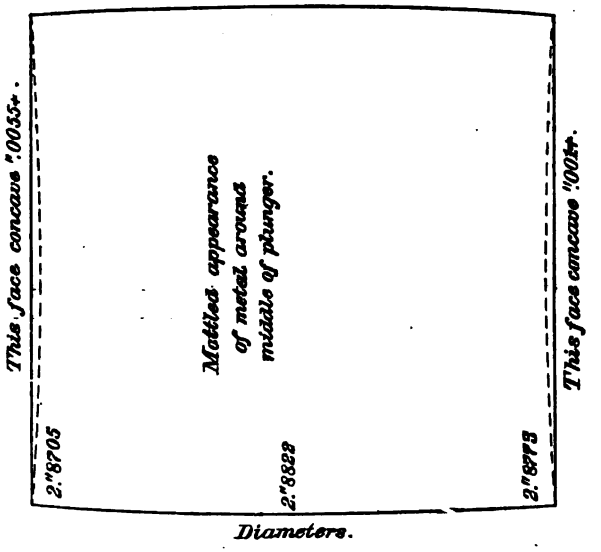
North end of specimen nearly flat after the test.

Diameters of specimen after the test: North, 2″.6973; middle, 2″.6960 +; south, 2″.6992 +.

Compression plunger (south end) took permanent concavity of about ″.0055 + and sides swelled.

Compression disk at north end concave about ″.003 + on side next specimen, after the test.

Shape of compression plunger (south end of specimen) after the test.

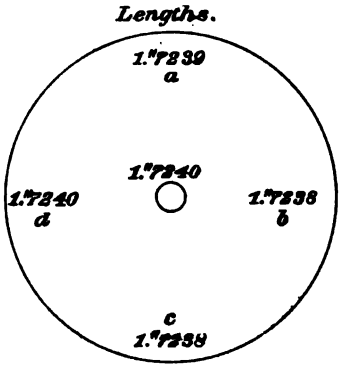


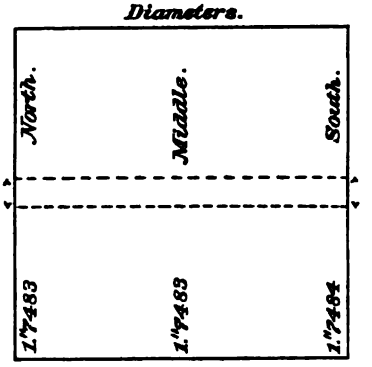
This plunger was hardened at Washington navy-yard. Heated to full red slowly and gradually, then quenched in oil, afterwards brought to a blue.

No. 4423.

Compression of specimen from cold-rolled steel bar.

[Measurements of specimen taken before the test, (measured on the specimen).]





Average diameter, 1.″74833.
Diameter of hole, average of ends: ″.1518, ″.1504.
Sectional area, 2.38188 square inches.

Loads applied.	Length of specimen central.		Diameters.			Remarks.
	Measured from plunger gauge.	Measured on specimen.	North.	Middle.	South.	
Pounds.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	
0	1.7245	1.7240	1.7483+	1.7483+	1.7484	The same hardened steel buttress used as in experiment with cold-swaged bar. The faces reground flat.
5,000	1.7243+	.....	.....	.....	.....	
0	1.7245	.....	.....	.....	.....	
10,000	1.7241+	.....	.....	.....	.....	
0	1.7245	.....	.....	.....	.....	
15,000	1.7239+	.....	.....	.....	.....	
0	1.7245	.....	.....	.....	.....	
20,000	1.7237+	.....	.....	.....	.....	
0	1.7245—	1.7240	.....	.....	.....	
25,000	1.7236+	.....	.....	.....	.....	
0	1.7245	.....	.....	.....	.....	
30,000	1.7236	.....	.....	.....	.....	
0	1.7245	.....	.....	.....	.....	
35,000	1.7234	.....	.....	.....	.....	
0	1.7245	1.7240	.....	.....	.....	
40,000	1.7234—	.....	.....	.....	.....	
0	1.7245	.....	.....	.....	.....	
45,000	1.7233	.....	.....	.....	.....	
0	1.7245	.....	.....	.....	.....	
50,000	1.7232+	.....	1.7483+	1.7483+	1.7484	
0	1.7245	1.7240	.....	.....	.....	
55,000	1.7231	.....	.....	.....	.....	
0	.....	.....	.....	.....	.....	
60,000	1.7230	.....	.....	.....	.....	
0	.....	.....	.....	.....	.....	
65,000	1.7229—	.....	.....	.....	.....	
0	.....	.....	.....	.....	.....	
70,000	1.7227	.....	.....	.....	.....	
0	.....	.....	.....	.....	.....	
75,000	1.7226	.....	.....	.....	.....	
0	.....	1.7240	.....	.....	.....	
80,000	1.7224+	.....	.....	.....	.....	
0	.....	.....	.....	.....	.....	
85,000	1.7223	.....	.....	.....	.....	
0	.....	.....	.....	.....	.....	

Loads applied.	Length of specimen central.		Diameters.			Remarks.
	Measured from plunger gauge.	Measured on specimen.	North.	Middle.	South.	
90,000	1.7222—					
0						
95,000	1.7221					
0		1.7240				
100,000	1.7218		1.7488+	1.7488	1.7487	
0	1.7245	1.7240	1.7483½	1.7484½		
105,000	1.7217		1.7481	1.7482		Measurement of diameters when the specimen was under load abandoned. The difficulty of getting at the specimen making the readings unreliable.
0						
110,000	1.7215					
0						
115,000	1.7214					
0		1.7240				
120,000	1.7213					
0						
125,000	1.7212					
0	1.7245	1.7240				
130,000	1.7211					
0						
135,000	1.7210					
0						
140,000	1.7208					
0		1.7240				
145,000	1.7205+					
0						
150,000	1.7204					
0	1.7242	1.7238				
155,000	1.7201					
0		1.7237+				
160,000	1.7199					
0		1.7237				
165,000	1.7198—					
0		1.7237				
170,000	1.7196					
0		1.7237—				
175,000	1.7193+					
0		1.7236				
180,000	1.7193					
0		1.7236				
Rested fifteen hours.						
185,000	1.7191+					
0		1.7236				
190,000	1.7188					
0		1.7235—				
195,000	1.7185—					
0		1.7233+				
200,000	1.7181+					
0	1.7234—	1.7232				
205,000	1.7176+					
0		1.7230				
210,000	1.7173					
0		1.7228				
215,000	1.7166					
0		1.7226				
220,000	1.7161+					
0		1.7224				Lengths at circumference: *a*, 1.7223; *b*, 1.7223; *c*, 1.7216; *d*, 1.7213.
225,000	1.7157—					
0		1.7220				
230,000	1.7150					
0		1.7214				
235,000	1.7137					
0		1.7206				
240,000	1.7127					
0	1.7196					
245,000	1.7094					
0		1.7165				
250,000	1.7044					
0	1.7116	1.7124				

Test discontinued.

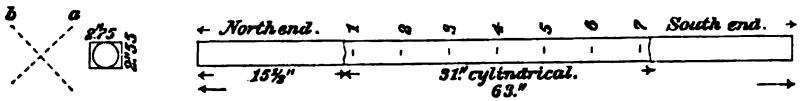
Lengths at circumference after test: *a*, 1.7112; *b*, 1.7138; *c*, 1.7119; *d*, 1.7102.

Diameters: north, 1.7557; middle, 1.7554; south, 1.7510.

No. 4424.

Tensile test of cold swaged steel bar.

[Cylindrical part of bar polished.]



Sectional area, 4.5344 square inches.
Gauged lengths, 20″.
Diameters from 1 to 7 measured 5″ apart along the cylindrical part.
Diameter *a* taken at right angles to diameter *b*, each being measured in line of diagonals of ends of specimen.

Measurement of diameters before testing.

	Inches.
Diameters (*a*):	
No. 1	2.4028
No. 2	2.4028
No. 3	2.4028
No. 4, horizontal diameter	2.4029+
No. 5	2.4028
No. 6	2.4028
No. 7	2.4028
Diameters (*b*):	
No. 1	2.4029
No. 2	2.4028
No. 3	2.4028
No. 4, vertical diameter	2.4029+
No. 5	2.4027+
No. 6	2.4028
No. 7	2.4028

Average diameter, 2″.4028.

Elongations and sets, measured with micrometer screw, within the gauged length.

Loads applied.	Elongation.	Permanent set.	Diameters.													
			1a.	1b.	2a.	2b.	3a.	3b.	4a.	4b.	5a.	5b.	6a.	6b.	7a.	7b.
	Inch.	*Inch.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
0	0	.....	2.4028	2.4029	2.4028	2.4028	2.4028	2.4028	2.4029+	2.4029+	2.4028	2.4027+	2.4028	2.4028	2.4028	2.4028
10,000	.0017	.....			2.4028	2.4028	2.4028	2.4028	2.4029+	2.4029+	2.4028	2.4027+	2.4028	2.4028	2.4028	.....
0	.....	.0000+														
20,000	.0032	.....			2.4028	2.4028	2.4028	2.4028	2.4029+	2.4029+	2.4028	2.4027+	2.4028	2.4028	2.4028	.....
0	.....	0														
30,000	.0048	.....			2.4028	2.4028	2.4028	2.4028	2.4029+	2.4029+	2.4028	2.4027+	2.4028	2.4028	2.4028	.....
0	.....	0														
40,000	.0061+	.....			2.4028	2.4028	2.4028	2.4028	2.4029+	2.4029+	2.4028	2.4027+	2.4028	2.4028	2.4028	.....
0	.....	0														
50,000	.0077	.....			2.4027	.....	2.4028	.....	2.4029+	.....	2.4028	.....	2.4028	.....	2.4028	.....
0	.....	0														
Specimen rested 16 hours.																
60,000	.0090	.....			2.4026+	2.4025½	2.4026+	2.4025½	2.4028—	2.4028—	2.4026+	2.4025½	2.4026+	2.4025½	.....	.....
0	.....	0														
70,000	.0104	.....			2.4025	2.4025—	2.4025	2.4025—	2.4026	2.4026	2.4025	2.4025—	2.4025	2.4025—	.....	.....
0	.....	0														
80,000	.0120	.....			2.4024½	2.4024+	2.4024½	2.4024+	2.4025	2.4025—	2.4024½	2.4024+	2.4024½	2.4024+	.....	.....
0	.....	0														
90,000	.0135	.....			2.4024	2.4024—	2.4024	2.4024—	2.4024½	2.4024½—	2.4024	2.4024—	2.4024	2.4024—	.....	.....
0	.....	0														
100,000	.0150	.....			2.4023	2.4023	2.4023	2.4023	2.4023½	2.4023½	2.4023	2.4023	2.4023	2.4023	.....	.....
0	.....	0														
110,000	.0165	.....			2.4022	2.4022	2.4022	2.4022	2.4023	2.4023	2.4022	2.4022	2.4022	2.4022	.....	.....
0	.....	0							2.4029+	2.4029+						
120,000	.0180	.....			2.4021+	2.4021+	2.4021+	2.4021+	2.4022	2.4022	2.4021+	2.4021+	2.4021+	2.4021+	.....	.....
0	.....	0														
130,000	.0195	.....			2.4021	2.4021	2.4021	2.4021	2.4021½	2.4021½	2.4021	2.4021	2.4021	2.4021	.....	.....
0	.....	0														
140,000	.0210	.....			2.4020	2.4020	2.4020	2.4020	2.4020½	2.4020½	2.4020	2.4020	2.4020	2.4020	.....	.....
0	.....	0														
150,000	.0224	.....			2.4019½	2.4019½	2.4019½	2.4019½	2.4020	2.4020	2.4019½	2.4019½	2.4019½	2.4019½	.....	.....
0	.....	0														
160,000	.0239	.....			2.4019	2.4019	2.4019	2.4019	2.4019½	2.4019½	2.4019	2.4019	2.4019	2.4019	.....	.....
0	.....	.0001½														
170,000	.0252	.....			2.4019	2.4019	2.4019	2.4019	2.4019½	2.4019½	2.4019	2.4019	2.4019	2.4019	.....	.....
0	.....	.0001½														
180,000	.0269	.....			2.4018½	2.4018½	2.4018½	2.4018½	2.4019	2.4019	2.4018½	2.4018½	2.4018½	2.4018½	.....	.....
0	.....	.0001½														
190,000	.0284	.....			2.4018	2.4018	2.4018	2.4018	2.4018½	2.4018½	2.4018	2.4018	2.4018	2.4018	.....	.....
0	.....	.0001½														

Elongations and sets measured with micrometer screw, within the gauged length—Continued.

Loads applied.	Elongation.	Permanent set.	Diameters.													
			1a.	1b.	2a.	2b.	3a.	3b.	4a.	4b.	5a.	5b.	6a.	6b.	7a.	7b.
	Inch.	*Inch.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
200,000	.0300				2.4017½	2.4017½	2.4017½	2.4017½	2.4018	2.4018	2.4017½	2.4017½	2.4017½	2.4017½		
0		.0002														
210,000	.0315				2.4017	2.4017	2.4017	2.4017	2.4017½	2.4017½	2.4017	2.4017	2.4017	2.4017		
0		.0002														
220,000	.0330				2.4016	2.4016	2.4016	2.4016	2.4016½	2.4016½	2.4016	2.4016	2.4016	2.4016		
0		.0002														
230,000	.0347				2.4015½	2.4015½	2.4015½	2.4015½	2.4015½	2.4015½	2.4015½	2.4015½	2.4015½	2.4015½		
0		.0002														
240,000	.0361				2.4015	2.4015	2.4015	2.4015	2.4015	2.4015	2.4015	2.4015	2.4015	2.4015		
0		.0002														
250,000	.0378				2.4014½	2.4014½	2.4014½	2.4014½	2.4014½	2.4014½	2.4014½	2.4014½	2.4014½	2.4014½		
0		.0003														
260,000	.0394				2.4014	2.4014	2.4014	2.4014	2.4014	2.4014	2.4014	2.4014	2.4014	2.4014		
0		.0003														
270,000	.0410				2.4014	2.4014	2.4014	2.4014	2.4014	2.4014	2.4014	2.4014	1.4014	2.4014		
0		.0003														
280,000	.0426				2.4013½	2.4013½	2.4013½	2.4013½	2.4013½	2.4013½	2.4013½	2.4013½	2.4013½	2.4013½		
0		.0004														
290,000	.0442				2.4013	2.4013	2.4013	2.4013	2.4013	2.4013	2.4013	2.4013	2.4013	2.4013		
0		.0004														
300,000	.0460				2.4012	2.4012	2.4012	2.4012	2.4012	2.4012	2.4012	2.4012	2.4012	2.4012		
0		.0006														
310,000	.0475				2.4011	2.4011	2.4011	2.4011	2.4011	2.4011	2.4011	2.4011	2.4011	2.4011		
0		.0007														
320,000	.0496				2.4010	2.4010	2.4010	2.4010	2.4010	2.4010	2.4010	2.4010	2.4010	2.4010		
0		.0009														
About 328,000																
0		.0010														
Micrometer gauge disturbed to —."0009. Reset to +."0010.																
0		.0010														
330,000	.0520				2.4009	2.4009	2.4009	2.4009	2.4009	2.4009	2.4009	2.4009	2.4009	2.4009		
330,000	.0522	After 10′ rest.														
0		.0011														
340,000	.0540				2.4008	2.4008	2.4008	2.4008	2.4008	2.4008	2.4008	2.4008	2.4008	2.4008		
340,000	.0542	4′ rest.														
0		.0014														
350,000	.0560				2.4007	2.4007	2.4007	2.4007	2.4007	2.4007	2.4007	2.4007	2.4007	2.4007		
350,000	.0563	4′ rest.														
0		.0018														
360,000	.0581				2.4006	2.4006	2.4006	2.4006	2.4006	2.4006	2.4006	2.4006	2.4006	2.4006		

360,000	.0586	4′ rest.															
0		.0023															
370,000	.0606				2.4005+	2.4005+	2.4005+	2.4005+	2.4005+	2.4005+	2.4005	2.4005	2.4005	2.4005			
370,000	.0614	4′ rest.															
0		.0030															
380,000	.0635				2.4005	2.4005	2.4005	2.4005	2.4005	2.4005	2.4004	2.4004	2.4004	2.4004			
380,000	.0644	4′ rest.															
0		.0040															
390,000	.0670				2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4002	2.4002	2.4002	2.4002			
390,000	.0679	4′ rest.															
0		.0052			2.4025	2.4025	2.4025	2.4025	2.4025	2.4025	2.4022	2.4022	2.4022	2.4022			
400,000	.0705		2.4006	2.4006	2.4002	2.4002	2.4002	2.4002	2.4002	2.4002	2.3999	2.3999	2.3999	2.3999	2.4001	2.4001	
400,000	.0728	6′ rest.															
400,000	.0732	9′ rest.															
0		.0082	2.4025	2.4025	2.4023	2.4023	2.4022	2.4022	2.4022	2.4022	2 4022	2.4022	2.4020	2.4020	2.4022	2.4022	
0		.0079	One hour rest.														
410,000	.0764		2.4005	2.4005	2.3998+	2.3998+	2.3999	2.3999	2.4000	2.4000	2.3997	2.3997	2.3997	2.3997	2.4000	2.4000	
410,000	.0795																
0		.0122	2.4025	2.4025	2.4021	2.4021	2.4021	2.4021	2.4021	2.4021	2.4019	2.4019	2.4019	2.4019	2.4020	2.4020	
420,000	.0850		2.4001	2.4001	2.3994	2.3995	2.3991	2.3992	2.3990	2.3990	2.3990	2.3990	2.3988	2.3990	2.3996	2.3996	
420,000	.0930	15′ rest.															
0		.0217	2.4023	2.4024	2.4020	2.4020	2.4015	2.4016	2.4015	2.4015	2,4015	2.4016	2.4011	2.4011	2.4016	2.4016	
0		.0214	12′ rest.														
0		.0210	About 30′ rest.														

Micrometer elongation instrument removed from the specimen.

Elongations hereafter measured with micrometer held on the specimen with the hands, introducing a probable error of .002+

430,000	.1090		2.3999	2.3999	2.3989	2.3988	2.3979	2.3981	2.3970	2 3970—	2.3981	2.3981	2.3974	2.3974	2.3990	2.3990	
									2.3963	After 15′ rest.							
430,000	.1280	17′ rest.															
0		.0530	2.4020	2.4020	2.4015	2.4015	2.4001	2.4005	2.3985	2.3985	2.4005	2.4005	2.3994	2.3994	2.4010	2.4010	

Time, 3.35 p. m.

437,000 Ultimate strength = 96.370 pounds per square inch.

Time, 3.50 p. m.

358,000																	
0			2.4021	2.4021	2.4014	2.4012	2.3977	2.3988	2.3741	2.3825	2 3999	2.3999	2.3981	2.3981	2.4010	2.4010	

Minimum diameters.

a, 1″.946; *b*, 1″.945.

Elongation of 5-inch sections.

″.00, ″.01½, ″.82, ″.02, ″.01½, ″.02½.

	Time.																
0	4.23 p. m.																
362,500	4.27 p. m.																
354,500	4.28 p. m.	Load at fracture.															
0																	

Diameters at fracture *a*, 1″.903; *b*, 1″.911.

Area at fracture, 2.8562 square inches. Contraction of area, 37 per cent.

Diameters after fracture.

			2.4030	2.4025	2.4013	2.4013	2.3976	2.3976	2.3888	2.3888	2.4003	2.4003	2.4000	2.4002	2.4021	2.4022	

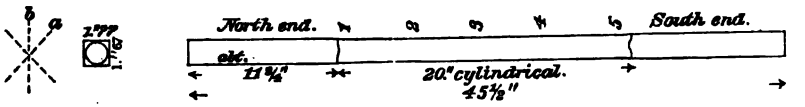
Fracture has smoky spot ″.6 diameter and about ¼″ eccentric.

Fine radial cracks at circumference of bar. Fractured surface irregular, presenting small bright facets.

No. 4425.

Tensile test of cold-rolled steel bar.

[Cylindrical part of bar polished.]



Sectional area, 1.7984 square inches.
Gauged length, 20″.
Diameters measured 5″ apart.
End diameters Nos. 1 and 5 taken about ″.6 inside 20″ section.

Diagonal diameters (*a*):

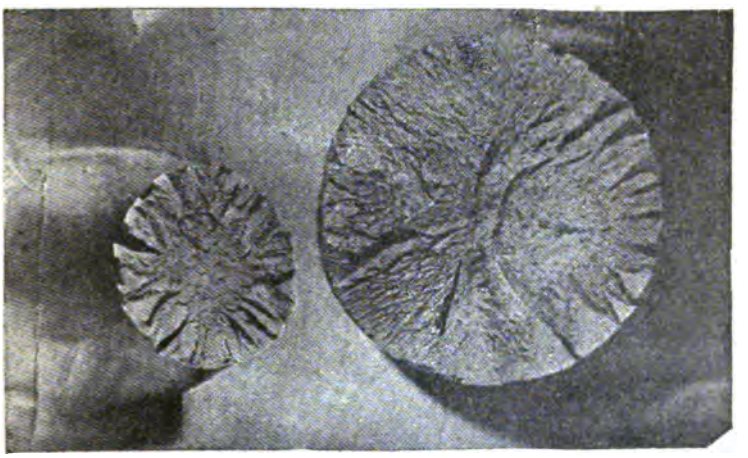
	Inches.
No. 1	1.5132
No. 2	1.5132
No. 3	1.5133
No. 4	1.5131
No. 5	1.5131

Vertical diameters (*b*):

No. 1	1.5132
No. 2	1.5132
No. 3	1.5133
No. 4	1.5131
No. 5	1.5134

Average diameter 1″.5132.

PHOTOGRAPH OF THE FRACTURED ENDS.



Bar No. 4425. Bar No. 4424.

S. Ex. 5, 1, 48.

Loads applied.	Elongation.	Permanent set.	Diameters.									
			1a.	1b.	2a.	2b.	3a.	3b.	4a.	4b.	5a.	5b.
Pounds.	*Inch.*	*Inch.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
0	0.	.....	1.5132	1.5132	1.5132	1.5132	1.5133	1.5133	1.5131	1.5131	1.5131	1.5134
5,000	.0022	.....	Repeated and same result obtained.									
0	.....	.0004										
Micrometer removed from specimen and examined, and found in good working order.												
5,000	.0024	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0008	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8,000	.0036	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0010	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9,000	.0043	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0010	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10,000	.0044	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0010	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0008	After 3′ rest.									
11,000	.0050	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0011	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12,000	.0054	.....	1.5130½	1.5130½	1.5132	.....	1.5132	.....	1.5132	.....	1.5131	.....
0	.....	.0011	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13,000	.0056	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0011	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14,000	.0061	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0010	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15,000	.0065	.....	1.5130½	1.5131	1.5132	1.5132	1.5132	1.5132	1.5132	1.5132	1.5131	1.5134
0	.....	.0010	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18,000	.0074	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	.....	.0010	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20,000	.0084	.....	1.5130½	.....	1.5132	.....	1.5132	.....	1.5132	.....	1.5131	.....
0	.....	.0010	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25,000	.0104	.....	1.5130½	.....	1.5132	.....	1.5132	.....	1.5132	.....	1.5131	.....
0	.....	.0010+	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30,000	.0123	.....	1.5129½	.....	1.5131	.....	1.5131	.....	1.5131	.....	1.5130	.....
0	.....	.0010+	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
35,000	.0141	.....	1.5129	.....	1.5130½	.....	1.5130	.....	1.5130½	.....	1.5130	.....
0	.....	.0010+	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40,000	.0164	.....	1.5128½	.....	1.5130	.....	1.5129½	.....	1.5130	.....	1.5129	.....
0	.....	.0013	1.5131	1.5131½	1.5132	1.5132	1.5131½	1.5131½	1.5132	1.5132	1.5131	1.5134
45,000	.0182	.....	1.5128	.....	1.5129	.....	1.5128½	.....	1.5129	.....	1.5129	.....
0	.....	.0013	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
50,000	.0203	.....	1.5127½	.....	1.5128½	.....	1.5128	.....	1.5128½	.....	1.5127½	.....
0	.....	.0014	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
55,000	.0222	.....	1.5127	.....	1.5128	.....	1.5127½	.....	1.5128	.....	1.5127	.....
0	.....	.0014	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
60,000	.0243	.....	1.5126½	.....	1.5127½	.....	1.5127	.....	1.5127½	.....	1.5126½	.....
0	.....	.0015	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Loads applied.	Elongation.	Permanent set.	Diameters.									
			1a.	1b.	2a.	2b.	3a.	3b.	4a.	4b.	5a.	5
Pounds.	*Inch.*	*Inch.*	*Inches.*	*Inches.*	*Inches*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
65,000	.0264		1.5125½		1.5127		1.5126½		1.5127		1.5126	
0		.0016										
70,000	.0285		1.5125		1.5126½		1.5126½		1.5126½		1.5125	
0		.0018										
75,000	.0304		1.5125		1.5126½		1.5126½		1.5126½		1.5125	
0		.0021										
80,000	.0329		1.5124½		1.5126		1.5126		1.5126		1.5124½	
0		.0023										
85,000	.0353		1.5124		1.5125½		1.5125½		1.5125½		1.5124	
0		.0025										
90,000	.0376		1.5123		1.5124		1.5124		1.5124		1.5123	
90,000	.0380	After 2½′ rest.										
0		.0028										
95,000	.0400		1.5122		1.5123		1.5123		1.5123		1.5122	
95,000	.0404	After 3′ rest.										
0		.0033										
100,000	.0424		1.5121½	1.5121½	1.5123	1.5123	1.5123	1.5123	1.5123	1.5123	1.5121½	1.5121½
100,000	.0428	After 5′ rest.										
0		.0035	1.5130	1.5130½	1.5132	1.5132	1.5131½	1.5131½	1.5132	1.5132	1.5131	1.5133
0		.0035	After 5′ rest.									
105,000	.0449		1.5120½		1.5122½		1.5122		1.5122		1.5120½	
105,000	.0454	After 4′ rest.										
0		.0042										
110,000	.0474		1.5120		1.5121½		1.5121½		1.5121½		1.5120	
110,000	.0479	After 3′ rest.										
0		.0045										
115,000	.0504		1.5119½		1.5121		1.5121		1.5121		1.5119½	
115,000	.0508	After 2′ rest.										
0		.0053										
120,000	.0531		1.5119		1.5120½		1.5120½		1.5120½		1.5119	
120,000	.0535	After 3½′ rest.										
0		.0063										
125,000	.0559		1.5118		1.5120		1.5120		1.5120		1.5118	
125,000	.0566	After 3′ rest.										
0		.0072										
130,000	.0593		1.5117		1.5120		1.5120		1.5119		1.5117	
130,000	.0600	After 3½′ rest.										
0		.0075										
135,000	.0625		1.5114		1.5119		1.5119		1.5118		1.5115	
135,000	.0635	After 3′ rest.										
0		.0089										
140,000	.0666		1.5112	1.5112	1.5118½	1.5118½	1.5118½	1.5118½	1.5115	1.5114½	1.5113½	1.5118½
140,000	.0678	After 3′ rest.										

0		.0110	1.5125	1.5125	1.5130	1.5130	1.5130	1.5130	1.5128½	1.5128½	1.5127	1.5129
0		.0108	After 5′ rest.									
145,000	.0717		1.5109½		1.5115		1.5115½		1.5112		1.5110½	
145,000	.0729	After 4′ rest.										
0		.0135										
150,000	.0766		1.5107½		1.5113		1.5114		1.5110		1.5108	
150,000	.0791	After 7′ rest.										
0		.0174										
0		.0172	After 14	hours rest.								

Micrometer elongation instrument removed when applying the following loads.

Measurements taken with instrument held by the hands on the specimen.

155,000	.0837		1.5103	1.5103	1.5112		1.5112		1.5108		1.5106	
0		.0214	1.5117		1.5126½		1.5126½		1.5122		1.5121	
160,000	.0929		1.5098		1.5109		1.5110		1.5104		1.5100	
0		.0284	1.5111		1.5125		1.5126		1.5120		1.5119	
165,000	.1066		1.5086	1.5085	1.5104	1.5104	1.5109	1.5107	1.5099	1.5095	1.5095	1.5095
0		.0404	1.5102	1.5100½	1.5120½	1.5120	1.5123	1.5124	1.5115	1.5115	1.5112	1.5112
170,000	.1319		1.5065		1.5099		1.5105		1.5090		1.5085	
0		.0595	1.5083		1.5115		1.5121		1.5110		1.5105	
175,000	.1945		1.4990		1.5083		1.5099		1.5072		1.5063	
0		.1174	1.5000		1.5100½		1.5115		1.5091		1.5082	
176,800	Time, 10 a. m. Ultimate strength = 98,310 pounds per square inch.											
140,000	Time, 10.25 a. m.											
0		.6545			1.5095	1.5091	1.5110	1.5110	1.5082	1.5082	1.5080	1.5080

10.40 a. m., load again applied. Minimum diameters { a 1″.178. b 1″.175. } About 1″ inside end section mark.

140,100	10.41 a. m. Elongation in north end 5″, section, ″.58.
131,600	10.43½ a. m. Load at time of fracture.

Diameters after fracture.			1.5094	1.5094	1.5116	1.5114	1.5096	1.5094	1.5090	1.5088

TESTS BY TENSION AND COMPRESSION OF STEEL BARS FROM THE NORWAY STEEL AND IRON COMPANY, SHOWING THE EFFECT OF COLD DRAWING.

THREE TENSILE BARS, TWO COMPRESSION BARS, CUT FROM THE SAME ORIGINAL BAR OF HOT ROLLED STEEL.

Tensile tests.

No. 4358.

Piece of the original hot rolled bar.
Surface in the condition it came from the rolls.
Total length, 66″.55.
Diameter, 2″.03; sectional area, 3.24 square inches.
Distance between holder jaws, 45″.
Gauged length, 30″.
Eight 5″ sections laid off on bar.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,240	1,000	0.	.....	
16,200	5,000	.0030	.....	
32,400	10,000	.0079	.....	
.....	1,000	.....	—.0010	Readings at 5,000 and 10,000 pounds per square inch repeated with same results as first obtained.
48,600	15,000	.0130	.....	
58,320	18,000	.0168	.....	
64,800	20,000	.0191	.....	
.....	1,000	.....	.0001	
66,000	.....	.0199	.....	
68,000	.....	.0208	.....	
70,000	.....	.0212	.....	
72,000	.....	.0221	.....	
74,000	.....	.0230	.....	
76,000	.....	.0238	.....	
78,000	.....	.0242	.....	
80,000	.....	.0251	.....	
81,000	25,000	.0256	.....	E between 10,000 and 25,000 pounds per square inch.
.....	1,000	.....	.0012	29,030,000.
82,000	.....	.0260	.....	
84,000	.....	.0268	.....	
86,000	26,540	.0276	.....	Elastic limit.
88,000	.....	.0287	.....	
90,000	.....	.0299	.....	
92,000	.....	.0318	.....	
94,000	.....	.0535	.....	
96,000	.....	.190	.....	
97,200	30,000	.32	.....	
98,000	.....	.38	.....	
100,000	.....	.45	.....	
113,400	35,000	.64	.....	
129,600	40,000	.99	.....	
145,800	45,000	1.47	.....	
162,000	50,000	2.24	.....	
179,500	55,400	.....	.....	Ultimate strength.
0	0	7.16	.....	=23.9 per cent.

Diameter of fracture, 1″.54; area, 1.86 square inches.
Contraction of area, 42.9 per cent.
Elongation of 5″ sections ″.87, ″.97, 1″.03, 1″.17 (1″.73 fractured section), 1″.13, 1″.13, 1″.06.
Oblique fracture; appearance silky.
Round spots from $\frac{1}{16}$″ to $\frac{1}{10}$″ diameter each, near center, presenting small, bright facets.

Cold Drawn Steel Bar.

No. 4359.

Diameter reduced in compressing dies (one pass), ″.094.
Total length, 59″.30.
Diameter, 1″.936; sectional area, 2.946 square inches.
Gauged length, 20″.
Distance between holder jaws, 37″.
Eight 5″ sections laid off on bar.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,946	1,000	0.		
14,730	5,000	.0025		
29,460	10,000	.0050		
	1,000		0.	
44,190	15,000	.0090		
53,028	18,000	.0110		
58,920	20,000	.0122		
	1,000		0.	
60,000		.0126		
62,000		.0130		
64,000		.0135		
66,000		.0140		
68,000		.0145		
70,000		.0150		
72,000		.0152		
73,650	25,000	.0158		E = 30,000,000.
	1,000		0.	
74,000		.0158		
75,000		.0161		
76,000		.0162		
77,000		.0164		
78,000		.0168		
79,000		.0170		
80,000		.0171		
81,000		.0173		
82,000		.0176		
83,000		.0179		
84,000		.0181		
85,000		.0182		
86,000		.0184		
87,000		.0187		
88,000		.0190		
88,380	30,000	.0191		
	1,000		0.	
89,000		.0191		
90,000		.0192		
91,000		.0194		
92,000		.0197		
94,000		.0201		
95,000		.0203		
96,000		.0207		
97,000		.0209		
98,000		.0210		
99,000		.0211		
100,000		.0214		
101,000		.0218		
102,000		.0220		
103,110	35,000	.0221		
	1,000		0.	
104,000		.0223		
105,000		.0228		
106,000		.0230		
107,000		.0231		
108,000		.0234		
109,000		.0237		
110,000		.0239		
111,000		.0240		
112,000		.0241		
113,000		.0244		
114,000		.0248		
115,000		.0250		
116,000		.0251		
117,000		.0254		
117,840	40,000	.0257		
	1,000		0.	

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
118,000		.0258		
119,000		.0260		
120,000		.0261		
121,000		.0265		
122,000		.0268		
123,000		.0270		
124,000		.0272		
125,000		.0274		
126,000		.0277		
127,000		.0281		
128,000		.0282		
129,000		.0285		
130,000		.0288		
131,000		.0290		
132,000		.0292		
132,570	45,000	.0298		
	1,000		0.	
133,000		.0294		
134,000		.0298		
135,000		.0301		
136,000		.0302		
137,000		.0306		
138,000		.0309		
139,000		.0311		
140,000		.0313		
141,000		.0317		
142,000		.0319		
143,000		.0321		
144,000		.0324		
145,000		.0328		
146,000		.0330		
147,300	50,000	.0333		
	1,000		.0005	
148,000		.0336		
149,000		.0339		
150,000		.0341		
151,000		.0344		
152,000		.0347		
153,000		.0350		
154,000		.0352		
155,000		.0350		
156,000		.0360		
157,000		.0363		
158,000		.0366		
159,000		.0370		
160,000		.0372		
161,000		.0377		
162,030	55,000	.0381		
	1,000		.0015	
163,000		.0388		
164,000		.0391		
165,000		.0395		
166,000		.0398		
167,000		.0402		
	1,000		.0027	
Dial-measuring instrument removed from specimen to avoid injury by fracture of bar.				
The following elongations, measured with screw micrometer held on bar with the hands:				
167,000		.0405		
168,000		.0411		
169,000		.0414		
170,000		.0418		
171,000		.0423		
172,000		.0428		
173,000		.0432		
174,000		.0437		
175,000		.0442		
176,000		.0449		
176,760	60,000	.0454		
	1,000		.0048	
177,000		.0456		
178,000		.0461		
179,000		.0467		
180,000	61,100	.0473		Elastic limit.
181,000		.0478		
182,000		.0487		
183,000		.0502		
184,000		.0511		
185,000		.0518		
186,000		.0528		
187,000		.0544		

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
188,000		.0557		
189,000		.0569		
190,000		.0584		
191,000		.0598		
191,490	65,000	.0620		
	1,000		.0178	
192,000		.0637		
193,000		.0653		
194,000		.0673		
195,000		.0728 .0774		Sustained load 5 minutes.
196,000		.0779		
197,000		.0838		
198,000		.0877		
199,000		.0960		
200,000		.134		
207,450	70,420			Ultimate strength.
0	0	.54		=2.7 per cent.

Diameter at fracture, 1″.58; area, 1.96 square inches.
Contraction of area, 33.5 per cent.
Elongation of 5″ sections: ″.10, ″.11, ″.12, ″.13, ″.18. (.78 fractured section.)
Oblique fracture, broke $4\frac{1}{2}$″ from face of holder jaws. Appearance silky. Round spots $\frac{1}{16}$″ to $\frac{1}{8}$″ diameter, with bright facets near center of fracture.

No. 4360.

Diameter reduced in compressing dies (one pass), ″.222.
Total length, 61″.04.
Diameter, 1″.808; sectional area, 2.567 square inches.
Gauged length, 20″.
Distance between holder-jaws, 39″.50.
Six 5″ sections laid off on bar.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,567	1,000	0.		
12,835	5,000	.0019		
25,670	10,000	.0050		
	1,000		—.0005	
38,505	15,000	.0081		
46,206	18,000	.0103		
51,340	20,000	.0117		
	1,000		—.0010	
52,000		.0119		
54,000		.0125		
56,000		.0130		
58,000		.0135		
60,000		.0141		
62,000		.0146		
64,175	25,000	.0151		
	1,000		—.0011	E=28,040,000.
66,000		.0157		
68,000		.0161		
70,000		.0167		
72,000		.0171		
74,000		.0177		
76,000		.0181		
77,010	30,000	.0185		
	1,000		—.0011	
78,000		.0188		
80,000		.0193		
82,000		.0199		
84,000		.0203		

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
86,000		.0208		
88,000		.0212		
89,845	35,000	.0218		
	1,000		—.0011	
90,000		.0220		
92,000		.0224		
94,000		.0230		
96,000		.0237		
98,000		.0241		
100,000		.0246		
102,000		.0251		
102,680	40,000	.0252		
	1,000		—.0011	
104,000		.0257		
106,000		.0261		
108,000		.0267		
110,000		.0272		
112,000		.0277		
114,000		.0282		
115,515	45,000	.0288		
	1,000		—.0011	
116,000		.0290		
118,000		.0295		
120,000		.0300		
122,000		.0306		
124,000		.0312		
126,000		.0319		
128,350	50,000	.0326		
	1,000		—.0005	
130,000		.0330		
132,000		.0338		
134,000		.0345		
136,000		.0351		
138,000		.0359		
140,000		.0368		
141,185	55,000	.0371		
	1,000		.0008	
142,000		.0375		
143,000		.0379		
144,000		.0382		
145,000		.0387		
146,000		.0391		
147,000		.0397		
148,000		.0400		
149,000		.0404		
150,000		.0409		
151,000		.0412		
152,000		.0418		
153,000		.0421		
154,020	60,000	.0427		
	1,000		.0028	
155,000		.0431		
156,000		.0438		
157,000		.0441		
158,000		.0447		
159,000		.0451		
160,000		.0457		
161,000		.0461		
162,000		.0468		
163,000		.0472		
164,000		.0478		
165,000		.0483		
166,000		.0489		
166,855	65,000	.0495		
	1,000		.0059	
Dial elongation instrument removed from specimen. The following elongations measured with a screw micrometer held on bar with the hands:				
168,000		.0500		
169,000		.0503		
170,000		.0510		
171,000		.0515		
172,000		.0520		
173,000		.0528		
174,000		.0531		
175,000		.0535		
176,000		.0540		
177,000		.0552		
178,000		.0557		
178,690	70,000	.0564		
	1,000		.0090	

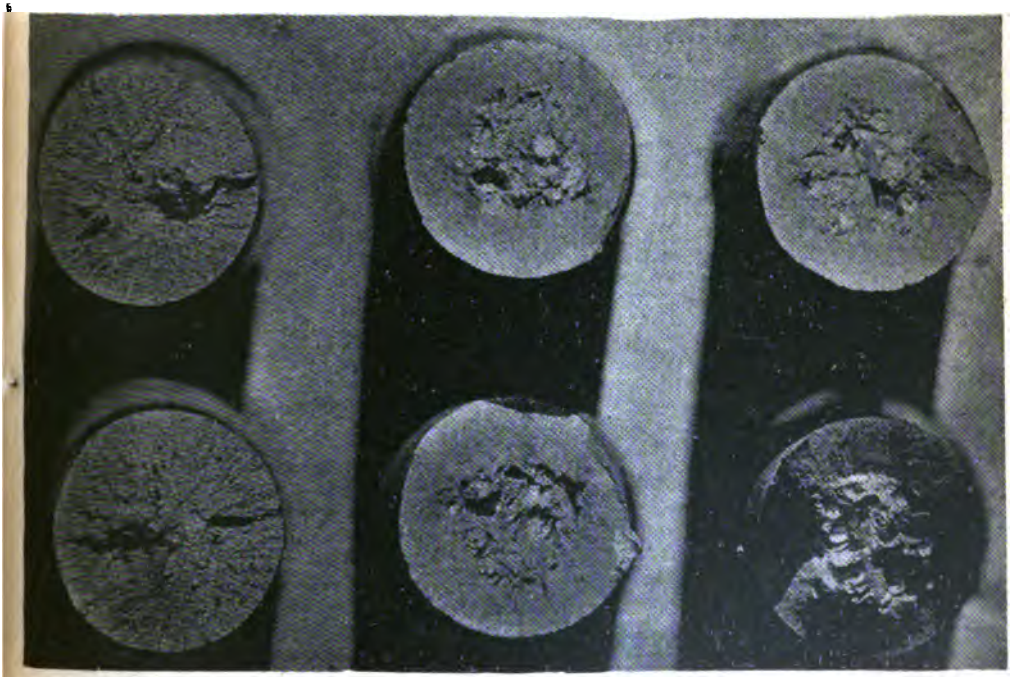
PHOTOGRAPHS OF FRACTURES

OF

HOT ROLLED AND COLD DRAWN STEEL BARS

FROM THE

NORWAY STEEL AND IRON CO.



Cold Drawn.	Cold Drawn.	Hot Rolled.
No. 4360.	No. 4359.	No. 4358.

S. Ex. 5, 1, 48.

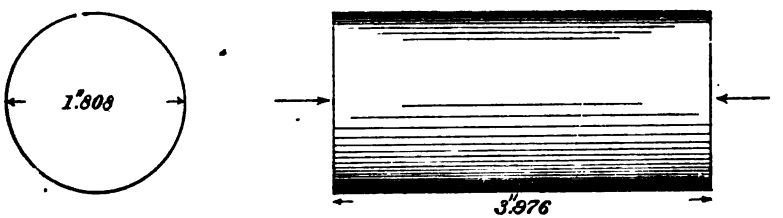
Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
179,000	.....	.0567	.....	
180,000	.....	.0574	.....	
181,000	.....	.0578	.....	
182,000	.....	.0585	.....	
183,000	.....	.0590	.....	
184,000	.....	.0600	.....	
185,000	.....	.0609	.....	
186,000	.....	.0620	.....	
187,000	.....	.0625	.....	
188,000	.....	.0640	.....	
189,000	.....	.0651	.....	
190,000	.....	.0664	.....	
191,000	.....	.0685	.....	
192,525	75,000	.0700	.....	
.....	1,000	.....	.0185	
193,000	.....	.0712	.....	
194,000	.....	.0721	.....	
195,000	.....	.0734	.....	
196,000	.....	.0750	.....	
197,000	.....	.0770	.....	
198,000	.....	.0806	.....	
199,000	.....	.0832	.....	
200,000	.....	.0860	.....	
201,000	.....	.0900	.....	
202,000	.....	.0957	.....	
203,000	.....	.1010	.....	
204,060	.....	.1080	.....	
205,360	80,000	.1189	.....	
.....	1,000	.....	.0630	
210,200	81,890	.....	.....	Ultimate strength.
0	0	.15	.....	=.075 per cent.

Diameter at fracture, 1″.65; area, 2.138 square inches.
Contraction of area, 16.7 per cent.
Elongation of 5″ sections: ″.04, ″.04, ″.03, ″.03, ″.05, ″.06.
Broke 1″ inside face of holder jaws.
Fine granular fracture square across bar.
Silky spot at center ″.25 × ″.50.
Elastic limit not well defined.

Cold drawn.

Compression specimens cut from the same bar as No. 4360.
Tested between flat steel platforms.
Compression measurements taken with a screw micrometer between center punch marks 12″ apart, made on the 3″ × 8″ steel platforms.

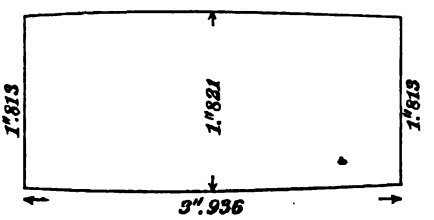
No. 4361.



Sectional area, 2.567 square inches.

Loads applied.	Pounds per square inch.	Compression.	Compression sets.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,567	1,000	0.		
12,835	5,000	.0007		
25,670	10,000	.0019		
38,505	15,000	.0032		
51,340	20,000	.0042		
	1,000		0.	
64,175	25,000	.0053		
77,010	30,000	.0065		
89,845	35,000	.0079		
102,680	40,000	.0090		
	1,000		.0007	
115,515	45,000	.0106		
	1,000		.0010	
128,350	50,000	.0125		
	1,000		.0017	
141,185	55,000	.0146		
	1,000		.0028	
154,020	60,000	.0179		
	1,000		.0049	
166,855	65,000	.0242		
	1,000		.0103	
178,690	70,000	.0343		
	1,000		.0189	
192,525	75,000	.0562		
	1,000		.0395	

Shape of specimen after test.

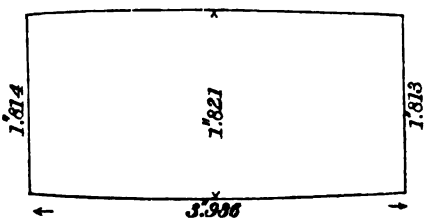


No. 4362.

Length, 3".976.
Diameter, 1".808.
Sectional area, 2.567 square inches.

Loads applied.	Pounds per square inch.	Compression.	Compression sets.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,567	1,000	0.		
12,835	5,000	.0013		
25,670	10,000	.0025		
38,505	15,000	.0037		
51,340	20,000	.0049		
	1,000		.0006	
64,175	25,000	.0059		
77,010	30,000	.0070		
89,845	35,000	.0082		
102,680	40,000	.0097		
	1,000		.0013	
115,515	45,000	.0115		
	1,000		.0019	
128,350	50,000	.0132		
	1,000		.0026	
141,185	55,000	.0154		
	1,000		.0040	
154,020	60,000	.0189		
	1,000		.0059	
166,855	65,000	.0195		
	1,000		.0065	
178,690	70,000	.0350		
	1,000		.0197	
192,525	75,000	.0578		
	1,000		.0400	

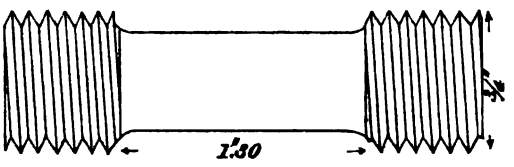
Shape of specimen after test.



7.

TENSILE TESTS OF STEEL SPECIMENS CUT FROM TUBE, CAST AT NORWAY STEEL AND IRON WORKS, SOUTH BOSTON, MASS., FOR WOODBRIDGE GUN.

Shape of specimens.



Number of test.	Mark on specimen.	Length between shoulders.	Diameter.	Sectional area.	Ultimate strength.		Elongation in 1″.30.		Diameter at fracture.	Area at fracture.
					Total pounds.	Pounds per square inch.	Inch.	Per cent.		
		Inches.	*Inch.*	*Sq.inch.*					*Inch.*	*Sq.inch.*
4575	1	1.30	.500	.1963	14,910	75,940	.20	15.4	.45	.1590
4576	2	1.30	.499	.1955	10,600	54,220	.45	34.6	.35	.0962
4577	3	1.30	.499	.1955	11,670	59,690	.48	36.9	.31	.0754
4578	4	1.30	.499	.1955	11,775	60,230	.46	35.4	.32	.0804

Number of test.	Contraction of area.	Appearance of fracture.
	Per cent.	
4575	19.0	Granular, 80 per cent. Dull spot at edge, 20 per cent.
4576	50.8	Oblique fracture, with irregular surface, fibrous, but not silky.
4577	61.4	Fine silky.
4578	58.9	Fine silky.

Chemical analyses made by Capt. John Pitman, U. S. A.

	No. 1.	No. 2.	No. 3.	No. 4.
Silicon	0.003	0.011	0.003	0.010
Phosphorus	0.074	0.031	0.055	0.040
Sulphur	0.037	0.016	0.013	0.019
Manganese	0.464	0.364	0.433	0.391
Copper	0.037	0.026	0.026	0.031
Cobalt	0.022	0.022	0.045	0.034
Nickel	0.157	0.149	0.062	0.117
Combined carbon	0.388	0.178	0.137	0.181
Graphite	0.021	0.014	0.026	0.031
Total carbon	0.409	0.192	0.163	0.212

7½.

TENSILE TESTS OF SIX STEEL EYE-BARS.

[Presented by M. A. Gottlieb, president of the Keystone Bridge Company, Pittsburgh, Pa., and forwarded for testing by Gus. C. Henning, M. E.]

Description of the material used in the steel eye-bars, and an account of their manufacture, from data furnished by Gus. C. Henning, M. E.

The eye-bars were made of Pernot open-hearth steel, furnished by the Cambria Iron Company, Johnstown, Pa.

The exact mixture used to obtain this steel is not known.

The furnace charges, about fifteen tons each of cast iron, magnetic ore, speigeleisen, and rail ends, preheated in an auxiliary furnace, required six and one half hours for their conversion.

All of these bars were rolled from the same ingot.

Samples were tested at the steel works, taken from a test ingot, about 1 inch square, from which were rolled ¾″ round specimens.

The annealed specimen was buried in hot ashes while still red hot, and allowed to cool with them.

The following results were obtained by tensile tests:

Tests made by William F. Zimmerman, M. E.

Material.	Diameter.	Sectional area.	Elastic limit. Pounds per square inch.	Ultimate strength. Pounds per square inch.	Elongation in 8 inches.	Contraction of area.	Modulus of elasticity.	Per cent. of carbon.
	Inch.	*Sq. inch.*			*Per cent.*	*Per cent*		
¾-inch round rolled bar.	.746	.4371	48.040	73,150	22.4	45.7	28,210,000	.27
¾-inch round rolled and annealed bar.	.747	.4383	42.210	69,470	25.6	54.2	29,210,000	.27

The billets measured 7″ × 8″, and were bloomed down from 14 inches square ingot.

They were rolled down to bar section in grooved rolls at the Union Iron Mills, Pittsburgh.

The reduction in the roughing rolls was from 7″ × 8″ to 6¼″ × 4″, and in the finishing rolls from 6¼″ × 4″ to 6½″ × 1″.

The successive sections of billets are shown by the accompanying drawing.

The eye-bar heads were made by the Keystone Bridge Company, Pittsburgh, by upsetting and hammering. Proceeding as follows:

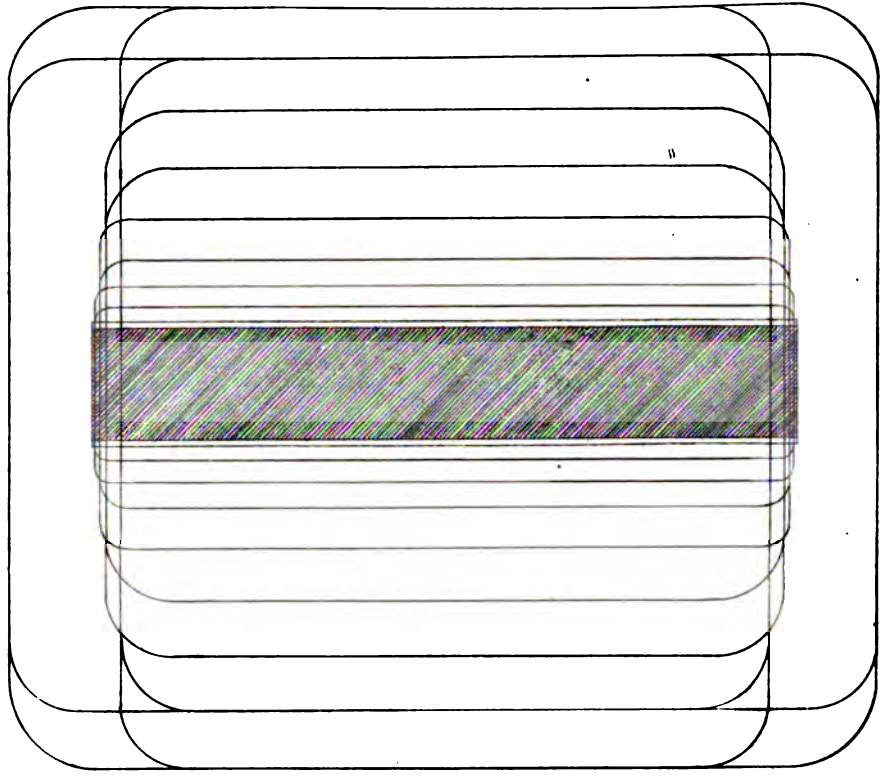
The bar is heated bright red for a length of (approximately) 27 inches, and upset in a hydraulic machine; after which the bar is reheated and drawn down to the required thickness, and given its proper form in a hammer die.

The bars are next annealed, which is done in a gas furnace longer than the bars. They are placed on edge, on a car in the annealing furnace, separated one from another, to allow free circulation of the heated gases. They are heated to a red heat, when the fires are drawn and the furnace allowed to cool. Three or four days, according to conditions, are required before the bars are withdrawn.

The pin-holes are then bored.

Successive sections of Billet.

Roughing Passes
Area
55.68 Sq. in.
44.62 " "
34.82 " "
25.02 " "
20.97 " "
24.42 " "
Time 5 min.



Finishing Passes
Area
19.07 Sq. in.
14.29 " "
11.40 " "
8.48 " "
7.31 " "
6.50 " "
Time 3 min.

S. EX. 5 , 1, 48.

The following is the chemical analysis of the heads before annealing. The analysis of all heads were exactly alike.

	Per cent.
Carbon, by color	.27
Silicon	.036
Sulphur	.075
Phosphorus	.090
Manganese	.380
Copper	trace.

Chemical analyses of eye-bar head after annealing.

[Borings were taken from each head after removing the surface scale.]

Number of test.	Mark on heads.	Carbon by color.	Manganese.	Silicon.	Sulphur.	Phosphorus.	Copper.
4582	M. 1	0.300	0.710	0.028	0.092	0.098	0.030
4582	M. 2	0.300	0.620	0.023	0.087	0.089	0.030
4583	D. 1	0.280	0.730	0.016	0.090	0.097	0.030
4583	D. 2	0.280	0.580	0.019	0.085	0.084	0.030
4584	Z. 1	0.280	0.650	0.023	0.081	0.092	0.035
4584	Z. 2	0.280	0.670	0.014	0.072	0.085	0.030
4585	P. 1	0.300	0.640	0.070	0.095	0.093	0.035
4585	P. 2	0.300	0.670	0.011	0.072	0.086	0.035
4586	U. 1	0.300	0.640	0.011	0.067	0.087	0.040
4586	U. 2	0.280	0.650	0.018	0.060	0.081	0.040
4587	L. 1	0.280	0.690	0.046	0.074	0.074	0.035
4587	L. 2	0.280	0.670	0.011	0.069	0.083	0.030

Analyses made by Hunt and Clapp, Pittsburgh Testing Laboratory.

Description and details of tests made at Watertown Arsenal.

The bars were tested in a horizontal position, secured at the ends by pins which were vertical.

To prevent sagging of the stem a counter weight was used at the middle of bar.

Before placing in the testing machine, the stem from neck to neck was laid off into 10″ sections, to determine the uniformity of the stretch after the bar had been fractured.

A number of the intermediate 10″ sections were used as the gauged length, obtaining micrometer measurements of elongations, and the elastic limit for that part of the stem which was not acted upon during the formation of the heads. Elongations were also measured from center to center of pins taken with an ordinary graduated steel scale.

The outlines of the heads were traced before and after the test, showing the distortion produced.

Near the close of each test elongations were taken only between centers of pins, the micrometer being removed from the gauged length to avoid injury when the bar broke.

When the behavior of the bar admitted, the stretch was recorded at the time of reaching the maximum load, also the load and stretch at time of fracture, the latter stretch being greater than that found after fracture, owing to the recovery of the metal when relieved of its load and the upsetting which results from the shocks of recoil.

The moduli of elasticity were computed from elongations taken between loads of 10,000 and 30,000 pounds per square inch, deducting the permanent sets.

The behavior of bars Nos. 4582 and 4583, after having been strained beyond the elastic limit, is shown by elongations of the gauged length measured after loads of 40,000 pounds per square inch and 50,000 pounds per square inch had been applied; and with bar No. 4583 after its first fracture under 64,000 pounds per square inch, a rest of five days inter-

vening between the time of fracture and time of measuring the elongations.

Considering the behavior between loads of 10,000 and 30,000 pounds per square inch we observe the elongations for the primitive readings are nearly in exact proportion to the increments of load.

Loads were increased to 40,000 pounds per square inch, passing the elastic limits at about 37,000 pounds per square inch.

The respective permanent stretch of the bars being 1.31 and 1.26 per cent.

Elongations were then immediately redetermined, which show a reduction in the modulus of elasticity as we advanced with each increment of 5,000 pounds per square inch.

Corresponding measurements after the bars had been loaded with 50,000 pounds per square inch reach the same kind of results.

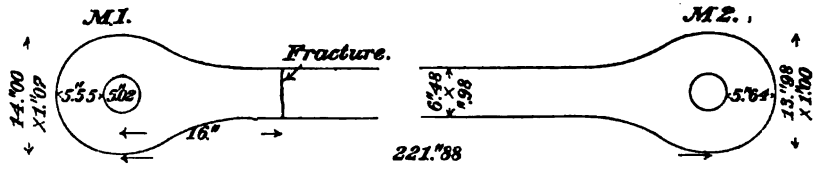
The first fracture of bar No. 4583 under 64,000 pounds per square inch occurred at the neck, leaving sufficient length to grasp in the hydraulic jaws of the testing machine, and continue observations on the original gauged length. This was done after the fractured bar had rested five days.

The elongations now show the modulus of elasticity constant or nearly so, the only difference in measurements being in the last figures up to 50,000 pounds. The readings were then immediately repeated, and the same uniformity of elongations obtained.

An illustration of the serious influence of defective metal in the heads is found in the first fracture of bar No. 4583.

There was about 27 per cent. excess of metal along the line of fracture over the section of the stem.

No. 4582.



Sectional area, 6.35 square inches.
Gauged length, 160″.

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inches.*	*Inches.*	
6,350	1,000	0.	.....	0.	
31,750	5,000	.0265	.....	.06	
63,500	10,000	.0551	.....	.12	
.....	1,000	.....	.0015	.01½	
95,250	15,000	.0825	.....	.17	
127,000	20,000	.1094	.....	.23	
.....	1,000	.....	.0016	.02	
158,750	25,000	.1363	.....	.28	
.....	1,000	.....	.0018	.....	
160,000	.....	.1373	.....	.....	
165,000	.....	.1420	.....	.....	
170,000	.....	.1464	.....	.....	
175,000	.....	.1504	.....	.....	
180,000	.....	.1548	.....	.....	
185,000	.....	.1590	.....	.....	
190,500	30,000	.1632	.....	.34	E=29,880.000.
192,000	.....	.1648	.....	.....	
194,000	.....	.1664	.....	.....	
196,000	.....	.1680	.....	.....	

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inches.*	*Inches.*	
198,000		.1700			
200,000		.1715		.36	
202,000		.1730			
204,000		.1750			
206,000		.1764			
208,000		.1782			
210,000		.1800		.39	
212,000		.1818			
214,000		.1832			
216,000		.1850			
218,000		.1865			
220,000		.1882			
222,250	35,000	.1900		43	
	1,000		.0020	.09	
224,000		.1920			
226,000		.1934			
228,000		.1955			
230,000		.1975		.49	
232,000		.1994			
234,000		.2012			
236,000		.2033			
238,060	37,480	.2055			Elastic limit.
240,000		.2100		.56	
242,000		.2160			
244,000		.2233			
246,000		.6170		1.18	
248,000		1.54		2.22	
254,000	40,000	2.37		3.15	
	1,000		2.10	2.72	
	1,000				Five minutes' rest given bar, at the end of which time the bar had recovered .″0015 additional. Set now being 2″.0985.
	1,000	0.			New readings taken within the gauged length, showing elongations after load of 40,000 pounds per square inch had been applied.
	5,000	.0260			
	10,000	.0575			
	15,000	.0875			
	20,000	.1180			
	25,000	.1500			
	30,000	.1830			
	1,000		.0020		
285,750	45,000	3.45		4.87	
317,500	50,000	4.95		7.02	
	1,000		4.60		
	1,000	0.			New readings taken within the gauged length, showing elongations after load of 50,000 pounds per square inch had been applied.
	5,000	.0262			
	10,000	.0585			
	15,000	.0896			
	20,000	.1218			
	25,000	.1555			
	30,000	.1896			
	1,000		.0013		
349,250	55,000			9.72	
381,000	60,000			13.70	
390,000				14.90	
400,000				16.85	
410,000				19.40	
412,750	65,000			20.30	
415,000				21.50	
419,000				23.37	
0	0				Rested five minutes.
420,000				23.87	
421,000				25.15	
422,000				25.90	
423,000				26.70	
424,000				27.45	
425,000				28.40	
426,000				29.20	
427,000				30.18	
428,000				30.80	
429,000				31.45	
429,500				32.25	
430,000				34.30	
430,500	67,800			35.85	Ultimate strength.
about 410,000				36.40	Load at time of fracture.
0	0	25.20			=15.8 per cent.

Elongation center to center of pin-holes 35″.37= —15.9 per cent.

Elongation of pin-holes M 1, .″75; M 2, 1″.08.

Elongation of 10″ sections (2″.79 fractured section), 1″.69, 1″.65, 1″.68, 1″.60, 1″.65, 1″.59, 1″.48, 1″.51, 1″.59, 1″.55, 1″.60, 1″.60, 1″.55, 1″.58, 1″.54, 1″.50, 1″.53, 1″.62, 1″.91.

Area at fracture 5″.33×.″79=4.21 square inches.

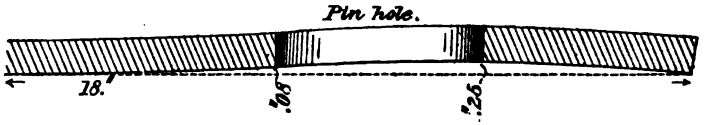
Contraction of area, 33.7 per cent.

Fractured 16″ from center of pin-hole M 1. Appearance of fracture silky center, with fine granular metal at sides radiating from center.

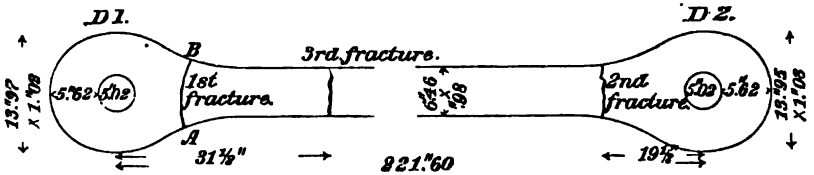
The thickening of the metal in front of pin-hole M 1, and dishing of the head, was such that the under side of the head was flat after the test.

Head M 2 was dished, concave on the under side. Placing an 18-inch straight-edge along the axis of the bar, showed an opening of the metal at the front side of the pin-hole of .″25, and at the back side of the pin-hole .″08.

Sketch showing dishing of head M 2:



No. 4583.



Sectional area, 6.33 square inches.

Gauged length, 160″.

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inches.*	*Inches.*	
6,330	1,000	0.		0.	Short kinks in bar near head D 2.
31,650	5,000	.0250		.05	
63,300	10,000	.0528		.10½	
	1,000		.0028	.01	
94,950	15,000	.0800		.16	
126,600	20,000	.1072		.21	
	1,000		.0039	.02	
158,250	25,000	.1340		.27	
	1,000		.0045	.02½	
160,000		.1355			
165,000		.1397			
170,000		.1440			
175,000		.1482			
180,000		.1523			
185,000		.1567			
189,900	30,000	.1607		.32	E=30,270,000.
	1,000		.0050	.04	
190,000		.1610			
192,000		.1630			
194,000		.1645			
196,000		.1660			
198,000		.1680			
200,000		.1695			
202,000		.1711			
204,000		.1730			

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inches.*	*Inches.*	
206,000	.....	.1747	.....	.....	
208,000	.....	.1766	.....	.....	
210,000	.....	.1781	.....	.....	
212,000	.....	.1797	.....	.....	
214,000	.....	.1816	.....	.....	
216,000	.....	.1831	.....	.....	
218,000	.....	.1847	.....	.....	
220,000	.....	.1866	.....	.....	
221,550	35,000	.1880	.....	.39	
.....	1,000	.....	.0050	.06	
222,000	.....	.1885	.....	.....	
224,000	.....	.1903	.....	.....	
226,000	.....	.1920	.....	.....	
228,000	.....	.1936	.....	.....	
230,000	.....	.1957	.....	.....	
232,000	36,650	.1981	.....	.....	Elastic limit.
234,000	.....	.2010	.....	.....	
236,000	.....	.2047	.....	.46	
238,000	.....	.2092	.....	.....	
240,000	.....	.2135	.....	.....	
242,000	.....	.2177	.....	.....	
244,000	.....	.2231	.....	.....	
246,000	.....	.2307	.....	.....	
248,000	.....	.2457	.....	.....	
250,000	.....	.8667	.....	1.45	
253,200	40,000	2.23	.....	3.06	
.....	1,000	.....	2.02	.....	=1.262 per cent.
.....	.....	.....	.....	2.63	
.....	1,000	0	.....	.....	New readings taken within the gauged length, showing elongations after load of 40,000 pounds per square inch had been applied.
.....	5,000	.0250	.....	.....	
.....	10,000	.0544	.....	.....	
.....	15,000	.0835	.....	.....	
.....	20,000	.1140	.....	.....	
.....	25,000	.1454	.....	.....	
.....	30,000	.1780	.....	.....	
.....	1,000	.....	.0020	.....	
284,850	45,000	3.27	.....	4.28	
316,500	50,000	4.67	.....	6.54	
.....	1,000	.....	4.34	.....	=2.712 per cent.
.....	.....	.....	.....	5.97	
.....	1,000	0	.....	.....	New readings taken within the gauged length, showing elongations, after loads of 50,000 pounds per square inch had been applied.
.....	5,000	.0256	.....	.....	
.....	10,000	.0558	.....	.....	
.....	15,000	.0860	.....	.....	
.....	20,000	.1175	.....	.....	
.....	25,000	.1500	.....	.....	
.....	30,000	.1840	.....	.....	
.....	1,000	.....	.0021	.....	
348,150	55,000	.....	.....	9.00	
379,800	60,000	.....	.....	12.45	
390,000	.....	.....	.....	13.75	
400,000	.....	.....	.....	15.60	
405,100	64,000	.....	.....	.....	Ultimate strength.
0	0	11.13	.....	.....	=6.96 per cent.

Elongation, center to center of pin-holes, 15.30 = 6.9 per cent.

Elongation of pin-holes, D 1, ".66; D 2, ".45.

Elongation of 10" sections: ".70, ".69, ".70, ".69, ".71, ".70, ".70, ".69, ".69, ".70, ".71, ".69, ".69, ".69, ".69, ".70, ".69, ".69, ".70, ".70.

Fractured suddenly without warning under the maximum load. Broke across neck $6\frac{1}{2}$" from center of pin-hole D 1. Line of fracture $8\frac{1}{4}$" long. Appearance granular, radiating from a fire crack ".30 long × ".05 deep, and a dull spongy spot ".4 × ".3 at corner A.

Surface of fracture serrated in radiating lines. It is probable the fracture began at the fire-crack corner (described as a "lap mark" by Mr. Henning) and tore across the neck; evidence of this manner of failure is furnished by three marks near the middle of the fractured surface of the long end of the bar, made by blows on the corner B of head D 1, during recoil after fracture, the head swinging around.

No. 4583[a].

Bar rested 5 days between tests Nos. 4583 and 4583[a].

End D 2, secured by its pin.

End D 1, secured between flat steel dies.

Gauged length same as in experiment No. 4583, covering 160″ of original length.

Present length, 171″.13.

Loads applied.	Pounds per square inch on original section.	In gauged length.		Remarks.
		Elongation.	Set.	
Pounds.		*Inch.*	*Inch.*	
6,330	1,000	.0	0.	
31,650	5,000	.0258	.....	
63,300	10,000	.0573	.....	
94,950	15,000	.0884	.....	
126,600	20,000	.1192	.....	
158,250	25,000	.1503	.....	
189,900	30,000	.1815	.....	
6,330	1,000	.....	.0008	
189,900	30,000	.1817	.....	
6,330	1,000	.....	.0010	
221,550	35,000	.2128	.....	
253,200	40,000	.2440	.....	
284,850	45,000	.2750	.....	
316,500	50,000	.3065	.....	
6,330	1,000	.....	.0016	
31,650	5,000	.0268	.....	
63,300	10,000	.0580	.....	
94,950	15,000	.0890	.....	
126,600	20,000	.1200	.....	
158,250	25,000	.1510	.....	
189,900	30,000	.1820	.....	
6,330	1,000	.....	.0013	
430,000	.....	.....	.....	Rapid stretching began.
453,000	71,560	.....	.....	Ultimate strength.
0	0	.1377	.....	= 8.6 per cent.

Total elongation of pin-hole D 2, ″.58.

Total elongation of 10″ sections (two sections at end D 1 not measured, covered by holder dies): ″.69, ″.69, ″.70, ″.70, ″.70, ″.84, ″.88, ″.90, ″.94, ″.91, ″.92, ″.92, ″.94, 1″.00, 1″.00, 1″.04, 1″.30 (2″.55 fractured section).

Area at fracture, 5″.29 × ″.76 = 4″.02 square inches.

Contraction of area, 36.5 per cent.

Fractured 19½″ from center of pin-hole D 2.

Appearance fine silky with about 10 per cent. granular metal at one edge, radiating from center.

No. 4583[b].

Bar rested 2 hours between tests Nos. 4583[a] and 4583[b].

Both ends of bar secured between flat steel dies.

Rapid stretching began at 445,000 pounds tension. Ultimate strength, 456,100 pounds = 72,050 pounds per square inch.

Load at time of fracture, 415,000 pounds.

Total elongation of 10″ sections (first section end D 1, not measured, covered by holder dies; (3″.05 fractured section): 1″.69, 1″.50, 1″.41, 1″.20, 1″.22, 1″.13, 1″.10, 1″.15, 1″.25, 1″.16, 1″.11, 1″.11, 1″.18, 1″.41, 1″.41, 1″.50. Two sections end D 2 not measured, covered by holder dies.

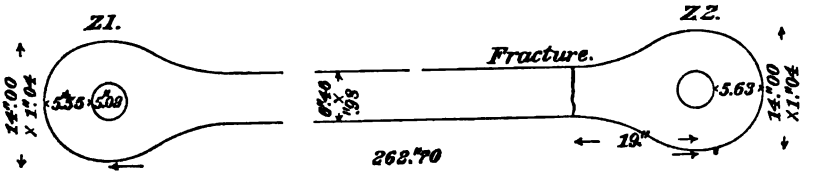
Area at fracture, 5″.20 × ″.75 = 3″.90.

Contraction of area, 38.4 per cent.

Fractured 25″ from first fracture or 31½″ from center of pin-hole D 1.

Appearance fine silky, with trace of granulation along middle of fractured surface.

No. 4584.



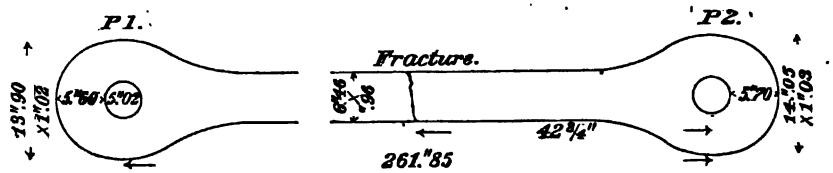
Sectional area, 6.33 square inches.
Gauged length, 200″.

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
6,330	1,000	0.		0.	
31,650	5,000	.0388		.06	
63,300	10,000	.0770		.12	
	1,000		.0043	.01½	
94,950	15,000	.1123		.18	
126,600	20,000	.1470		.24	
	1,000		.0059	.02	
158,250	25,000	.1810		.30	
	1,000		.0067	.02½	
160,000		.1830			
165,000		.1881			
170,000		.1935			
175,000		.1990			
180,000		.2045			
185,000		.2096			
189,900	30,000	.2150		.36½	E 29,630,000.
	1,000		.0073	.04	
190,000		.2150			
192,000		.2170			
194,000		.2194			
196,000		.2213			
198,000		.2235			
200,000		.2256			
202,000		.2280			
204,000		.2300			
206,000		.2322			
208,000		.2343			
210,000		.2365			
212,000		.2390			
214,000		.2409			
216,000		.2430			
218,000		.2452			
220,000		.2474			
221,550	35,000	.2490		.44	
	1,000		.0104	.05	
222,000		.2500			
224,000		.2520			
226,000		.2545			
228,000		.2566			
230,000		.2590			
232,000		.2617			
234,000		.2644			
236,000		.2670			
238,000	37,600	.2703			Elastic limit.
240,000		.2732			
242,000		.2783		.64	Rapid stretching taking
244,000		.2860		.74	place along stem, about
246,000		.3150		.88	20″ from center of pins.
248,000		.491		1.16	
250,000		1.10		1.78	
253,200	40,000	1.92		2.66	
284,850	45,000	3.91		5.14	
316,500	50,000	5.55		7.38	
348,150	55,000			10.20	
379,800	60,000			14.20	
411,450	65,000			20.40	
419,000				22.82	
0	0				Rested 5 minutes.
420,000				24.30	

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
422,000	.....	.....	.....	25.24	
424,000	.....	.....	.....	26.17	
426,000	.....	.....	.....	27.10	
428,000	.....	.....	.....	28.30	
430,000	.....	.....	.....	29.25	
432,000	.....	.....	.....	30.50	
434,000	.....	.....	.....	32.10	
435,000	68,720	.....	.....	33.90	Ultimate strength.
.....	.....	.....	.....	.....	
414,000	.....	.....	.....	34.50	Load at time of fracture.
0	0	24.67	.....	.....	=12.3 per cent.

Elongation, center to center of pin holes, 33″.18 = 12.6 per cent.
Elongation of pin holes, Z 1, ″.65; Z 2, ″.73.
Elongation of 10″ sections, 1″.38, 1″.28, 1″.25, 1″.26, 1″.22, 1″.22, 1″.20, 1″.20, 1″.21, 1″.22, 1″.19, 1″.26, 1″.34, 1″.21, 1″.20, 1″.19, 1″.12, 1″.15, 1″.20, 1″.21, 1″.32, 1″.50, 1″.62 (2″.50 fractured section).
Area at fracture, 5″.34 × ″.78 = 4.17 square inches.
Contraction of area, 34.1 per cent.
Fractured 19″ from center of pin hole Z 2.
Appearance of fracture silky 70 per cent., with fine granular metal 30 per cent. at sides, radiating from center.

No. 4585.



Sectional area, 6.20 square inches.
Gauged length, 200″.

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
6,200	1,000	0.	.....	0.	
31,000	5,000	.0379	.....	.07	
62,000	10,000	.0724	.....	.13	
.....	1,000	.....	.0060	.02	
93,000	15,000	.1056	.....	.19	
124,000	20,000	.1394	.....	.25	
.....	1,000	.....	.0094	.02½	
155,000	25,000	.1725	.....	.31	
.....	1,000	.....	.0070	.03	
160,000	.....	.1780	.....	.....	
165,000	.....	.1834	.....	.....	
170,000	.....	.1887	.....	.....	
175,000	.....	.1940	.....	.....	
180,000	.....	.2000	.....	.....	
185,000	.....	.2047	.....	.....	
186,000	30,000	.2060	.....	.37	E 29,960,000.
.....	1,000	.....	.0070	.04½	
188,000	.....	.2085	.....	.....	

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
190,000	.....	.2102	.....	.....	
192,000	.....	.2128	.....	.....	
194,000	.....	.2147	.....	.....	
196,000	.....	.2167	.....	.....	
198,000	.....	.2190	.....	.....	
200,000	.....	.2216	.....	.40	
202,000	.....	.2233	.....	.....	
204,000	.....	.2255	.....	.....	
206,000	.....	.2275	.....	.....	
208,000	.....	.2300	.....	.....	
210,000	.....	.2320	.....	.....	
212,000	.....	.2340	.....	.....	
214,000	.....	.2363	.....	.....	
216,000	.....	.2387	.....	.....	
217,000	35,000	.2404	.....	.45	
.....	1,000	.....	.0065	.07	
218,000	.....	.2419	.....	.....	
220,000	.....	.2445	.....	.....	
222,000	35,810	.2474	.....	.46½	Elastic limit.
224,000	.....	.2521	.....	.....	
226,000	.....	.2595	.....	.....	
228,000	.....	.2850	.....	.....	
230,000	.....	.3635	.....	.61	
232,000	.....	.3781	.....	.69	
234,000	.....	.3907	.....	.81	
236,000	.....	.408	.....	.93	
238,000	.....	1.35	.....	1.99	
240,000	.....	1.87	.....	2.50	
248,000	40,000	2.80	.....	3.57	
279,000	45,000	4.36	.....	5.64	
310,000	50,000	6.25	.....	8.14	
341,000	55,000	.....	.....	11.35	
372,000	60,000	.....	.....	16.10	
397,000	.....	.....	.....	22.70	
0	0	.....	.....	.....	Rested 5 minutes.
400,000	.....	.....	.....	24.30	
403,000	65,000	.....	.....	25.90	
405,000	.....	.....	.....	27.20	
408,300	65,850	.....	.....	30.40	Ultimate strength.
375,000	.....	.....	.....	.....	Load at time of fracture.
0	0	24.05	.....	.....	= 12.0 per cent.

Elongation, center to center of pin holes, 30″.21=11.5 per cent.

Elongation of pin holes, P 1, ″.68; P 2, ″.64.

Elongation of 10″ sections, 1″.01, ″.99, 1″.00, 1″.00, 1″.00, ″.99, ″.99, 1″.04, 1″.05, 1″.03, 1″.04, 1″,25, 1″.44, 1″.15, 1″.00, 1″.02, 1″.08, 1″.01, 1″.00, 1″.08, 1″.38 (3″.50 fractured section) 1″.48, 1″.10.

Area at fracture, 5″.10 × ″.74 = 3.77 square inches.

Contraction of area, 39.2 per cent.

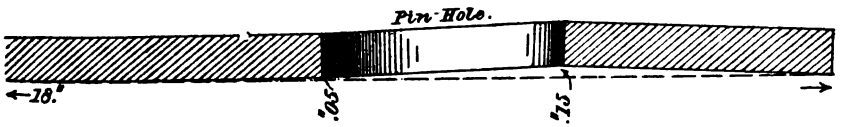
Fractured 42¾″ from center of pin hole P 2.

Tore apart from one edge. Fractured ends brought together leave an opening on this edge of ″.15.

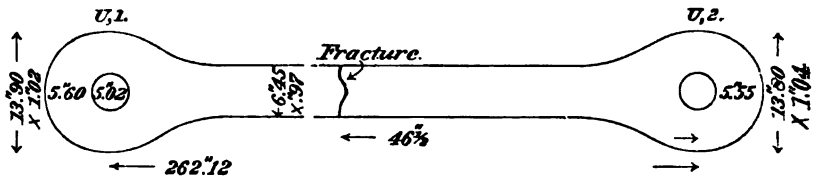
Short surface cracks and blister 1¼″ × ⅜″ near edge first fractured.

Appearance fine silky 70 per cent., fine granular 30 per cent. radiating from center, for the part last fractured.

Heads were dish-shaped after test.



No. 4586.



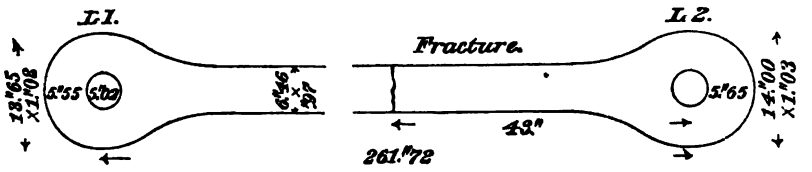
Sectional area, 6.26 square inches.
Gauged length, 200″.

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
6,260	1,000	0.		0.	
31,300	5,000	.0400		.08	
62,600	10,000	.0748		.14	
	1,000		.0091	.02	
93,900	15,000	.1086		.20	
125,200	20,000	.1420		.27	
	1,000		.0093	.03	
156,500	25,000	.1755		.32	
	1,000		.0104	.03	
Test resumed after fifteen hours' rest.					
	1,000		.0084		
	5,000	.0393			
	10,000	.0740			
	15,000	.1080			
	20,000	.1414			
	25,000	.1745			
	1,000		.0079		
160,000		.1784			
165,000		.1840			
170,000		.1887			
175,000		.1943			
180,000		.1995			
185,000		.2048			
187,800	30,000	.2080		.38	E = 29,670,000.
	1,000		.0075	.04½	
190,000		.2105			
192,000		.2128			
194,000		.2153			
196,000		.2175			
198,000		.2200			
200,000		.2222		.41	
202,000		.2250			
204,000		.2280			
206,000		.2312			
208,000	33,230	.2348			Elastic limit.
210,000		.2390		.45	
212,000		.2435			
214,000		.2476			
216,000		.2530			
218,000		.2660			
219,000	35,000	.3094		.55	
	1,000		.0810	.17½	
220,000		.6465		.98	
222,000		1.32		1.66	Rested under this load one-half hour.
225,360	36,000	1.64		2.07	
231,620	37,000	1.16		2.75	
237,880	38,000	3.08		3.77	
244,140	39,000	3.33		4.21	
250,400	40,000	3.58		4.56	
281,700	45,000	5.33		6.92	
313,000	50,000	7.50		9.75	
344,300	55,000			13.60	
375,600	60,000			20.63	
0	0				Rested five minutes.
380,000				21.94	
385,000				23.70	
390,000				25.94	
395,000				28.05	
400,000				31.20	
401,000				32.30	

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
402,000	.....	.....	.....	34.10	
402,600	.....	.....	.....	35.10	
403,000	.....	.....	.....	36.60	
403,200	64,410	.....	.....	38.25	Ultimate strength.
355,000	.....	.....	.....	40.65	Load at time of fracture.
0	0	32.84	.....	.....	= 16.4 per cent.

Elongation center to center of pin-holes, 39″.56 = 15.1 per cent.
Elongation of pin-holes, U 1, ″.70; U 2, ″.75.
Elongation of 10″ sections: 1″.39, 1″.42, 1″.81, 1″.79, 1″.75, 1″.31, 1″.62, 1″.89, 1″.29, 1″.12, 1″.19, 2″.05, 1″.90, 1″.32, 1″.10, 1″.45, 1″.60, 1″.50, 1″.19, 1″.14, 2″.24 (3″.58 fractured section), 1″.30, 1″.10.
Area at fracture, 4″.94 × ″.64 = 3.16 square inches.
Contraction of area, 49.5 per cent.
Fractured 46½″ from center of pin-hole, U 2.
Appearance, fine, silky, 100 per cent. Opened a seam five-eighths inch long near center of fracture.
Heads dished about ″.08 concave, measured from an 18″ straight edge.

No. 4587.



Sectional area, 6.27 square inches.
Gauged length, 200″.

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
6,270	1,000	0.	.....	0.	
31,350	5,000	.0341	.....	.06	
62,700	10,000	.0690	.....	.12	
.....	1,000	.....	.0045	.01	
94,050	15,000	.1025	.....	.18	
125,400	20,000	.1365	.....	.24	
.....	1,000	.....	.0050	.01½	
156,750	25,000	.1700	.....	.31	
.....	1,000	.....	.0050	.02½	
160,000	.....	.1733	.....	.....	
165,000	.....	.1784	.....	.....	
170,000	.....	.1836	.....	.....	
175,000	.....	.1889	.....	.....	
180,000	.....	.1945	.....	.....	
185,000	.....	.1998	.....	.....	
188,100	30,000	.2030	.....	.37	E=29,960,000.
.....	1,000	.....	.0050	.03	
190,000	.....	.2050	.....	.....	
192,000	.....	.2076	.....	.....	
194,000	.....	.2095	.....	.....	
196,000	.....	.2115	.....	.....	
198,000	.....	.2138	.....	.....	
200,000	.....	.2160	.....	.39	
202,000	.....	.2180	.....	.....	
204,000	.....	.2200	.....	.....	
206,000	.....	.2223	.....	.....	
208,000	.....	.2248	.....	.....	
210,000	.....	.2265	.....	.....	

Loads applied.	Pounds per square inch.	In gauged length.		Elongation center to center of pins.	Remarks.
		Elongation.	Set.		
Pounds.		*Inches.*	*Inch.*	*Inches.*	
212,000	.....	.2287	.....	.....	
214,000	.....	.2310	.....	.....	
216,000	.....	.2330	.....	.....	
218,000	.....	.2353	.....	.....	
219,450	35,000	.2368	.....	.44	
.....	1,000	.....	.0046	.06	
220,000	.....	.2375	.....	.....	
222,000	.....	.2400	.....	.....	
224,000	.....	.2420	.....	.....	
226,000	.....	.2443	.....	.47	
228,000	.....	.2470	.....	.49	
230,000	.....	.2500	.....	.50½	
232,000	.....	.2524	.....	.51	
234,000	.....	.2553	.....	.....	Elastic limit.
236,000	37,640	.2580	.....	.53½	
238,000	.....	.2618	.....	.55	
240,000	.....	.2675	.....	.58	
242,000	.....	.2736	.....	.61	
244,000	.....	.98	.....	1.60	
246,000	.....	1.28	.....	1.96	
250,800	40,000	2.31	.....	3.06	
282,150	45,000	4.00	.....	5.21	
313,500	50,000	5.75	.....	7.56	
344,850	55,000	.....	.....	10.30	
376,200	60,000	.....	.....	14.70	
390,000	.....	.....	.....	17.00	
400,000	.....	.....	.....	19.50	
410,000	.....	.....	.....	22.65	
0	0	.....	.....	.....	
420,000	.....	.....	.....	27.00	
425,000	.....	.....	.....	30.45	
426,000	.....	.....	.....	31.70	
427,000	.....	.....	.....	32.90	
428,000	.....	.....	.....	34.50	
428,200	68,290	.....	.....	35.45	Ultimate strength.
about 380,000	.....	.....	.....	36.10	Load at time of fracture.
0	0	27.79	.....	.....	= 13.9 per cent.

Elongation, center to center of pin-holes, 35″.23=13.5 per cent.

Elongation of pin-holes, L 1, ″.80; L 2, ″.58.

Elongation of 10″ sections: 1″.53, 1″.25, 1″.40, 1″.43, 1″.31, 1″.31, 1.″28, 1″.25, 1″.26, 1″.21, 1.″28, 1″.45, 1″.52, 1″.21, 1″.15, 1″.15, 1″.11, 1″.10, 1″.05, 1″.12, 1″.50 (3″.70 fractured section), 1″.64, 1″.25.

Area at fracture, 5″.02×″.72=3.61 square inches.

Contraction of area, 42.4 per cent.

Fractured 43″ from center of pin-hole, L 2.

Appearance, fine, silky, with slight granulation.

TABULATION OF STEEL EYE-BAR TESTS.

Number of test.	Distinguishing letter.	Dimensions, inches.			Sectional area.	Elastic limit.	Ultimate strength.		Elongation, per cent.	
		Length.	Width.	Thickness.			Total pounds.	Pounds per square inch.	In gauged length.	From center to center of pins.
					Sq. in.	*Lbs. per sq. in.*				
4582	M	221.88	6.48	.98	6.35	37,480	430,500	67,800	15.8	15.9
4583	D	221.60	6.46	.98	6.33	36,650	405,100	64,000	.....	.....
4583*a*	D	.....	.....	.....	.....	.....	453,000	71,560	13.77	.....
4583*b*	D	.....	.....	.....	.....	.....	456,100	72,050	.....	.....
4584	Z	262.70	6.46	.98	6.33	37,600	435,000	68,720	12.3	12.6
4585	P	261.85	6.46	.96	6.20	35,810	408,300	65,850	12.0	11.5
4586	U	262.12	6.45	.97	6.26	33,230	403,200	64,410	16.4	15.1
4587	L	261.72	6.46	.97	6.27	37,640	428,200	68,290	13.9	13.5

TABULATION OF STEEL EYE-BAR TESTS—Continued.

Number of test.	Contraction of area.	Modulus of elasticity.	Maximum compression on pin-holes.	Position of fracture.	Appearance of fracture.
	Per cent.		*Lbs. per sq. in.*		
4582	33.7	29,880,000	86,100	Broke in stem	Silky and granular.
4583	.....	30,270,000	79,430	Broke across neck	Granular.
4583a	36.5	.....	.....	Broke in stem	Fine silky and granular.
4583b	38.4	.....	.....	....do	Fine silky trace of granulation.
4584	34.1	29,630,000	83,650	....do	Silky and granular.
4585	39.2	29,960,000	80,060	....do	Fine silky and granular.
4586	49.5	29,670,000	79,060	....do	Fine silky.
4587	42.4	29,960,000	83,960	... do	Fine silky and granular.

TABULATION AND CURVES SHOWING THE EFFECT ON EYE-BARS NOS. 4582 AND 4583 OF LOADS ABOVE THE ELASTIC LIMIT OF THE MATERIAL.

Elongations of bars Nos. 4582 *and* 4583 *for each increment of* 5,000 *pounds per square inch*

No. 4582.

Loads, pounds per square inch.	Elongations.		
	Primative loading.	After load of 40,000 pounds per square inch.	After load of 50,000 pounds per square inch.
	Inch.	*Inch.*	*Inch.*
10,000	.....	.....	.....
15,000	.0274	.0300	.0311
20,000	.0269	.0305	.0322
25,000	.0269	.0320	.0337
30,000	.0269	.0330	.0341

No. 4583.

Loads, pounds per square inch.	Elongations.			Elongations after 64,000 pounds per square inch.	
	Primative loading.	After load of 40,000 pounds per square inch.	After load of 50,000 pounds per square inch.	First reading.	Second reading.
	Inch.	*Inch.*	*Inch.*	*Inch.*	*Inch.*
10,000	.....	.....	.....	.....	.....
15,000	.0272	.0291	.0302	.0311	.0310
20,000	.0272	.0305	.0315	.0308	.0310
25,000	.0268	.0314	.0325	.0311	.0310
30,000	.0267	.0326	.0340	.0312	.0310
35,000	.....	.....	.....	.0311	.....
40,000	.....	.....	.....	.0312	.....
45,000	.....	.....	.....	.0310	.....
50,000	.....	.....	.....	.0315	.....

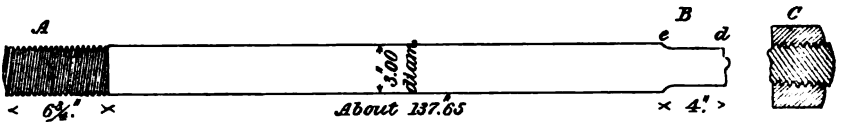
These elongations are intended to show the effect within the primitive elastic limit of loads which exceed that limit when the loads are immediately repeated or after a period of rest.

To show the absolute change in the modulus of elasticity requires a determination of the change in volume, which it is not practical to obtain with undressed rolled bars.

8.

TENSILE STRENGTH OF WROUGHT-IRON PISTON-ROD FROM 20-INCH GUN-CARRIAGE AT FORT HAMILTON, NEW YORK.

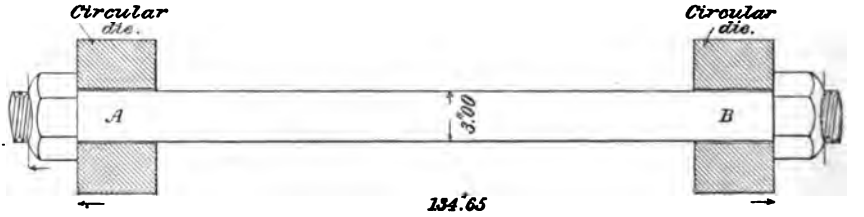
[Tested for Col. T. G. Baylor, president of Ordnance Board.]



The above sketch represents the piston-rod as received for test. The end A was threaded with a truncated thread V V V V 4½ to the inch. The broken end B had been threaded as far as the point *d* with a full thread V V V 4½ to the inch. A nut came with this end. From *d* to *e* (4 inches) there was no thread.

It was decided to first test the rod, as in practice, by pulling it between nuts screwed on the ends, as it was known that much of the strength of the rod must be sacrificed by this manner of threading, and afterwards test the strength of the rod itself between holders. Accordingly a thread was cut at the end B to fit the nut C, and a new nut was made for the end A. The precaution was taken to make the new thread fully as large as the nut would allow, and also to round the shoulder at *e*.

The rod was then placed in the machine, as here shown.



Upon applying the stress to the nuts the rod broke at the face of the nut B, under a total stress of 197,920 pounds, or 28,000 pounds per square inch of the full section, and 44,580 pounds per square inch of broken section (at root of thread).

The end B was now clamped in holders, and the stress continued until the end A broke at face of nut, under a total stress of 227,600 pounds, which was 32,200 pounds per square inch on the full section of the rod, and 47,520 pounds per square inch at root of thread.

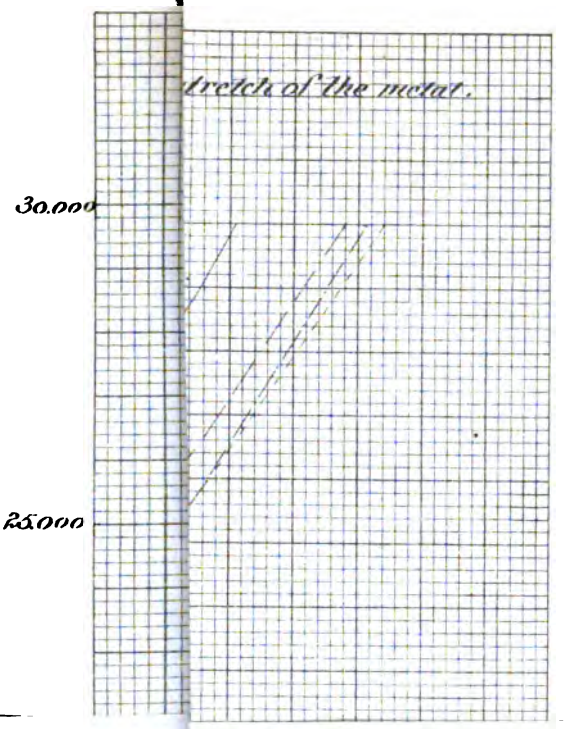
Both ends of the rod were now secured in circular holders, and the strain continued to rupture, giving a total stress of 344,100 pounds, or 48,680 pounds per square inch.

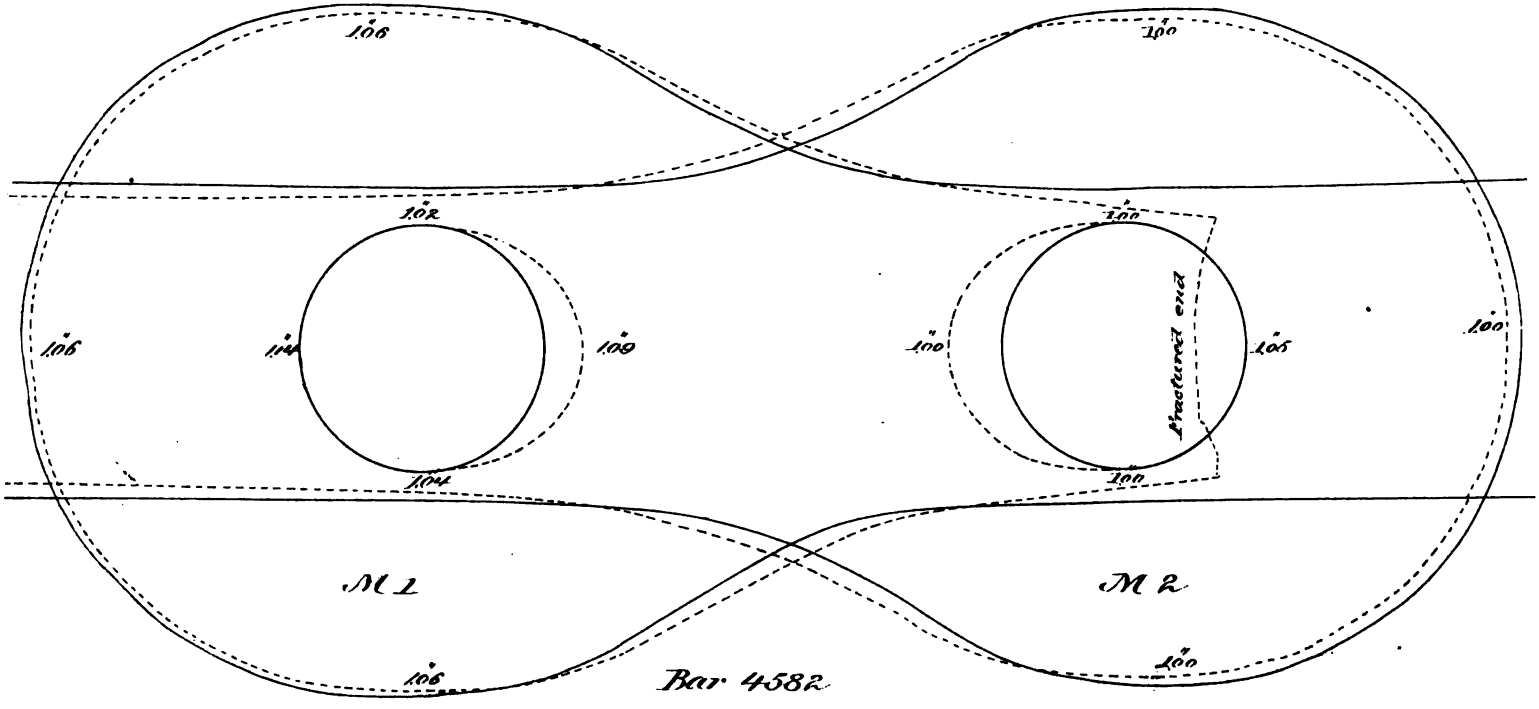
Hence it is seen that the V-thread at the end A weakened the rod from 48,000 pounds per square inch to 32,000 pounds, or 33 per cent., while the deeper V-thread at the end B brought the strength down to 28,000 pounds per square inch, or 42 per cent.

The following are the details of the test:

No. 4574.

Original fracture of bar at end B.
Diameter at root of thread, 2″.40.
Sectional area, 4.524 square inches.
Appearance of original fracture, coarse granular.


tretch of the metal.
30.000
25.000



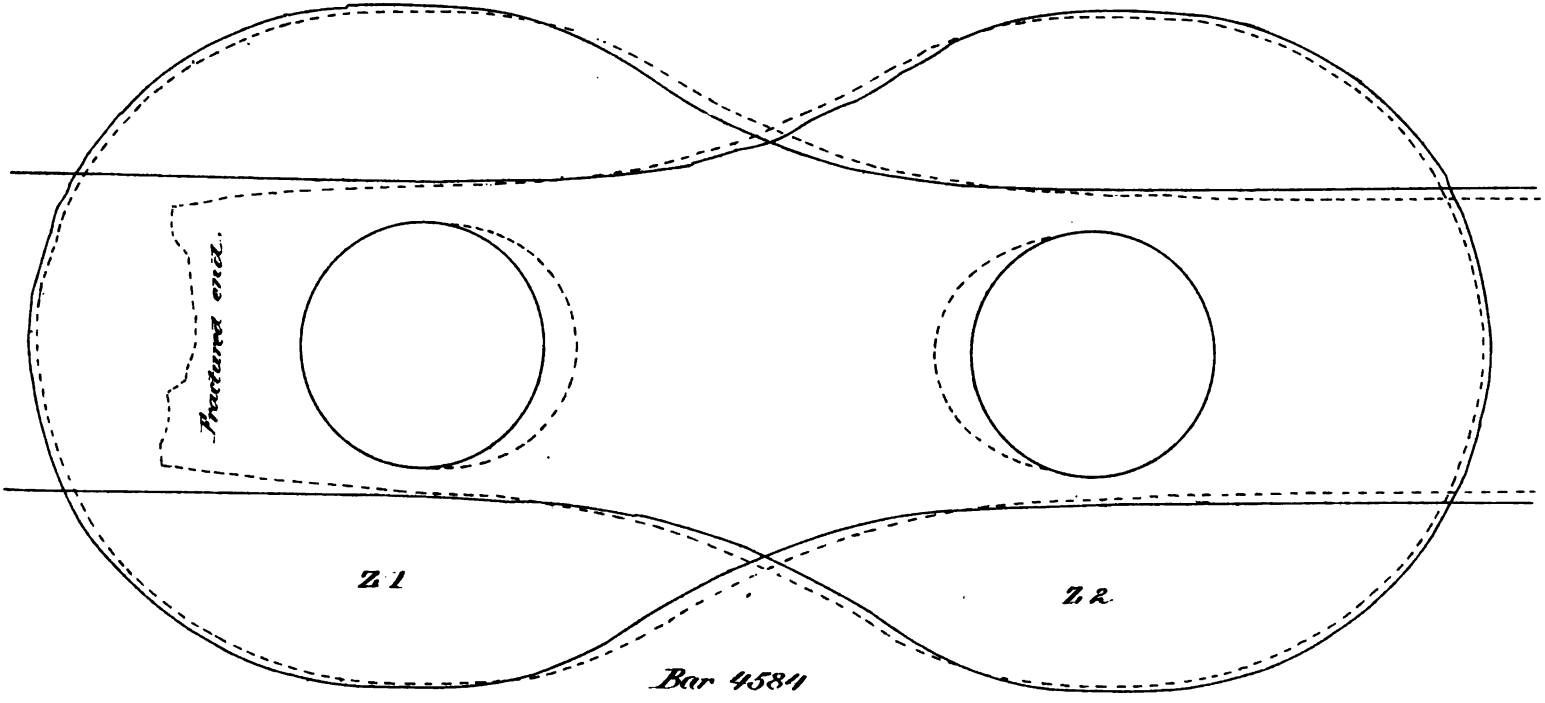
Bar 4582

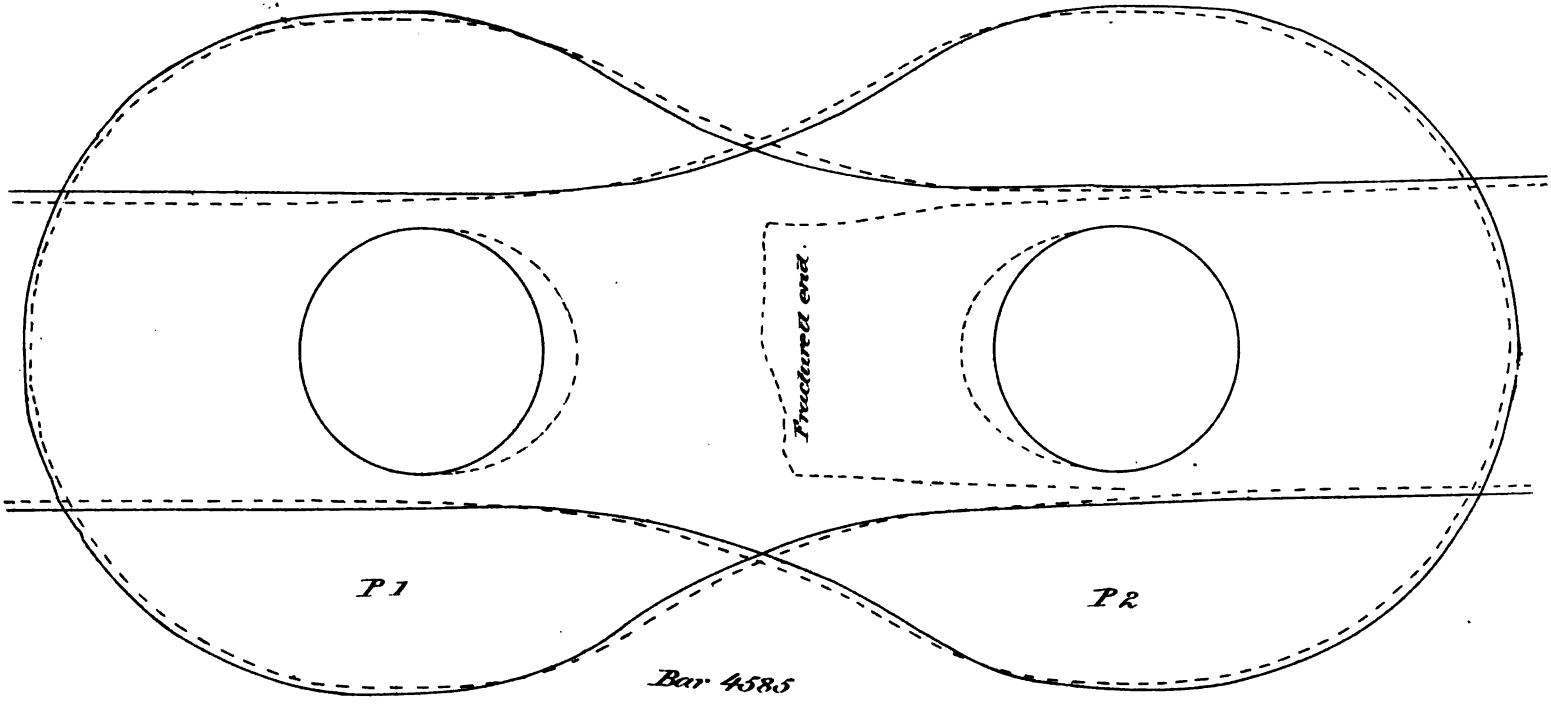
Figures on the heads show the thickness of metal after the test.

S. EX. 5, 1, 48.

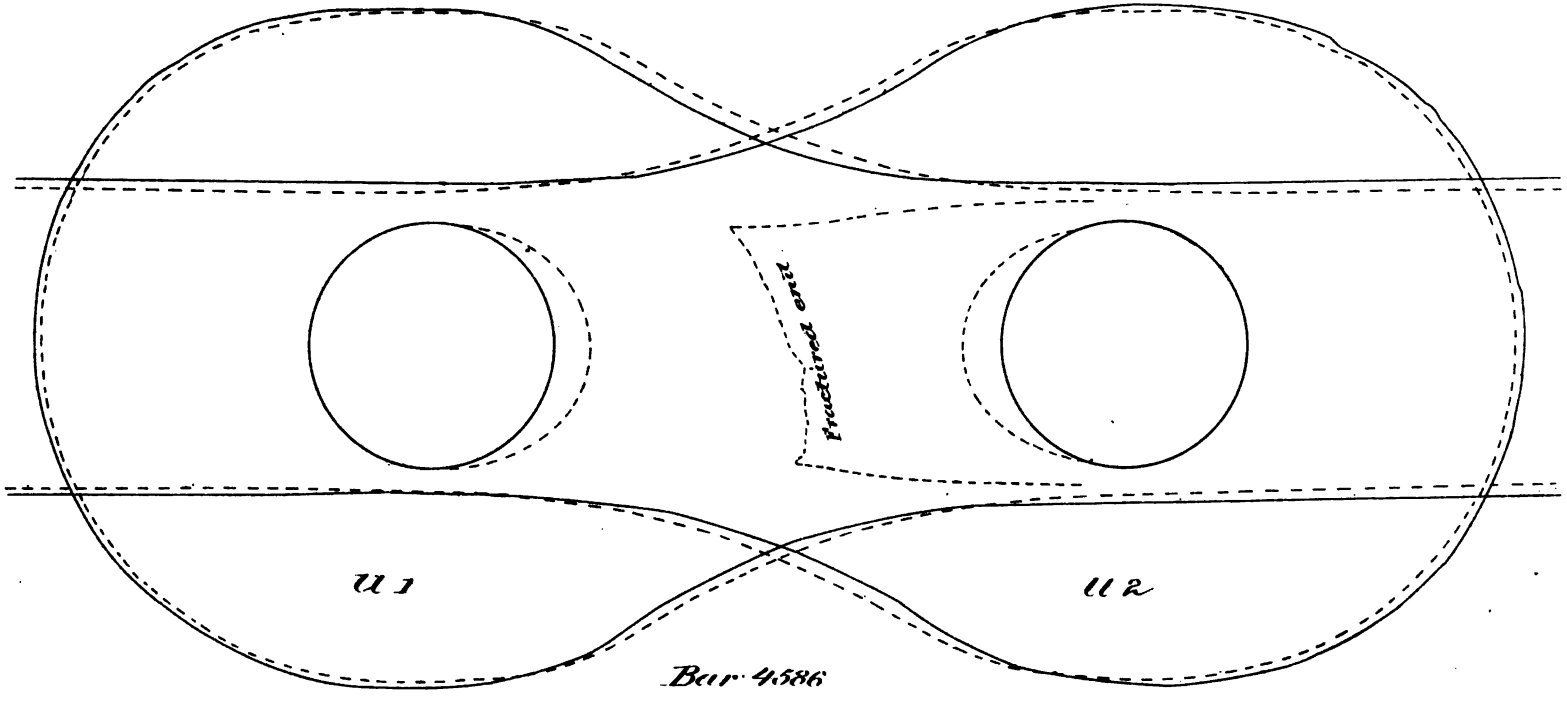
Ex. J. 148

Ant Fracture
D1
Per 4663
Alt fracture
These marks are fractures
on face, made by opening it
during the recent rubber fracture
D2
3rd Fracture.


Fracture ouv.
Z. 1
Z. 2
Bar 4584

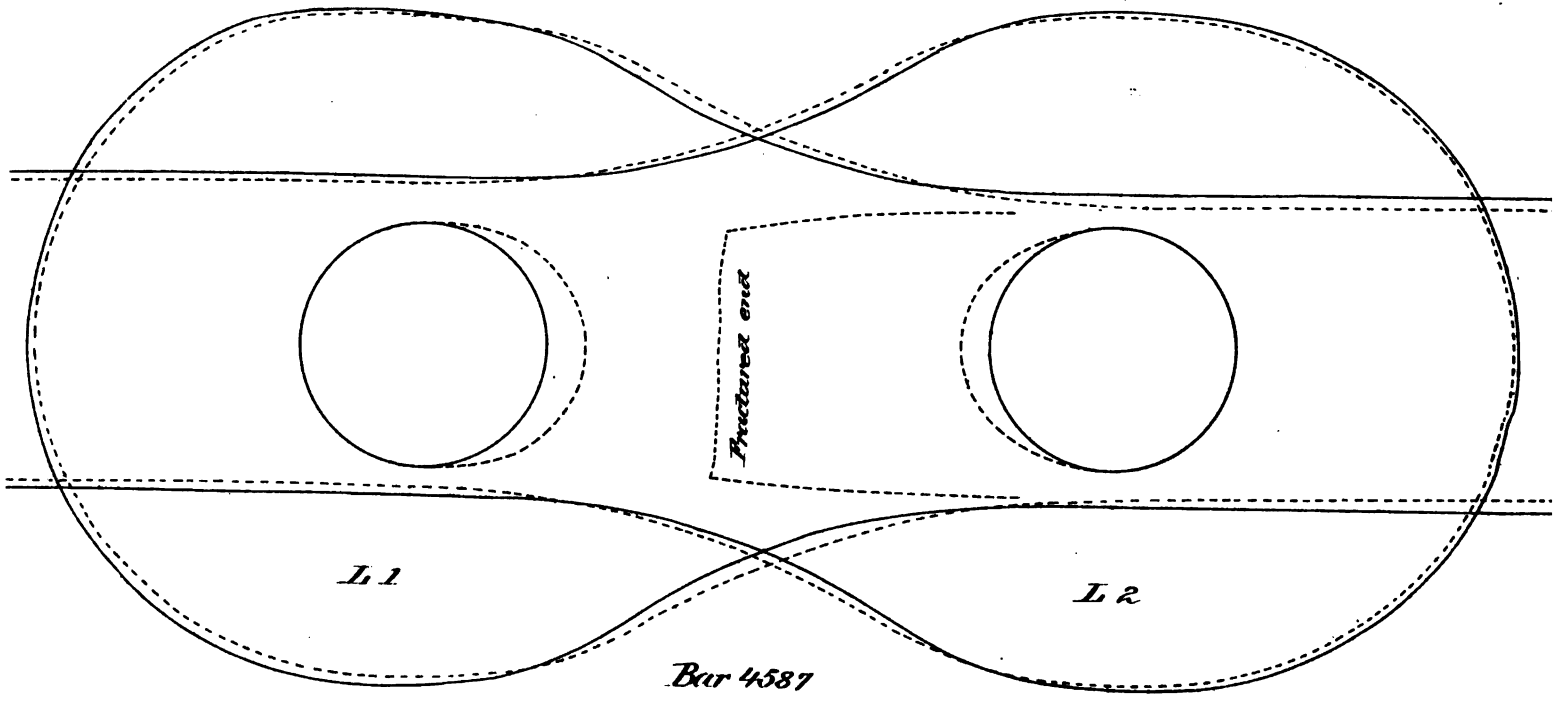


S. EX. 5 , 1, 48.



Bur 4586

S. EX. 5 .1.48.



Bar 4587

S. EX. 5, 1, 48.

Dimensions of bar before test.

End A, diameter of thread, 2″.74.
Diameter at root of thread, 2″.47 = 4.79 square inch area.
Threads per inch, $4\frac{1}{2}$.
Square shoulder connects threaded end with stem of bar.
End B, threaded at Watertown Arsenal.
Diameter of thread, 2″.74.
Diameter at root of thread, 2″.38 = 4.44 square inch area.
Threads per inch, $4\frac{1}{2}$.
Fillet of about $\frac{1}{8}$″ radius connects threaded end with stem of bar.
Sectional area of stem, 7.0686 square inches.
Gauged length, 100″.
Both ends secured by the nuts. Nuts screwed on bar as far as threads would allow.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inches.*	*Inches.*	
7,069	1,000	0.		Elongations and sets determined within the gauged length of 100″.
35,343	5,000	.0143		
70,686	10,000	.0323		
	1,000		.0004	
75,000		.0345		
80,000		.0370		
85,000		.0397		
90,000		.0422		
95,000		.0447		
100,000		.0470		
105,000		.0498		
106,029	15,000	.0502		
	1,000		.0007	
110,000		.0525		
115,000		.0550		
120,000		.0576		
125,000		.0604		
130,000		.0634		
135,000		.0668		
140,000		.0697		
141,372	20,000	.0714		Elastic limit approximate. Not well defined.
	1,000		.0044	
142,000		.0729		
144,000		.0747		
146,000		.0766		
148,000		.0785		
150,000		.0810		
	1,000		.0099	
152,000		.0837		
154,000		.0862		
156,000		.0888		
158,000		.0917		
160,000		.0949		
	1,000		.0185	
162,000		.1010		
164,000		.1035		
166,000		.1092		
168,000		.1147		
170,000		.1210		
	1,000		.0387	
172,000		.1295		
174,000		.1420		
176,000		.1540		
176,715	25,000	.1660		
	1,000		.0800	
Micrometer removed while loads were applied, to avoid injury by the sudden fracture of the bar.				
Micrometer held on the specimen with the hands when the following sets were determined:				
183,783	26,000			Snapping sounds.
	1,000		.142	
190,852	27,000			Snapping sounds repeated.
	1,000		.235	

Loads applied.	Pounds per square inch.	Elongation	Permanent set.	Remarks.
Pounds.		*Inches.*	*Inches.*	
197,920	28,000			Sustained this load about one minute, then fractured at end B at face of nut. Tensile strength at root of thread end B = 44.580 pounds per square inch.
	1,000		.314	
Rested one hour, then end B clamped in circular holder dies.				
204,989	29,000			
	1,000		.452	
212,058	30,000			
	1,000		.661	
219,127	31,000			Snapping sounds.
	1,000		.918	
226,195	32,000			
	1,000		1.16	Fractured at end A at face of nut.
227,600	32,200			
Tensile strength at root of thread end A 47.520 pounds per square inch.				
Both ends now secured in circular holder dies.				
247,401	35,000			
	1,000		2.07	
282,744	40,000			
	1,000		4.06	
344,100	48,680			Ultimate strength of stem.
0	0	16.59		= 16.6 per cent.

Fractured $1\frac{1}{2}''$ from face of holder dies.

Diameter at fracture, 2″.70; area = 5.726 square inches.

Contraction of area, 18.9 per cent.

Elongation of 10″ sections after fracture: 1″.98, 1″.33, 1″.78, 1″.78, 1″.63, 1″.52, 1″.36, 1″.43, 2″.11, 1″.67.

Appearance of fracture, laminated granular. Coarser granulation at center than at circumference of each break.

9.

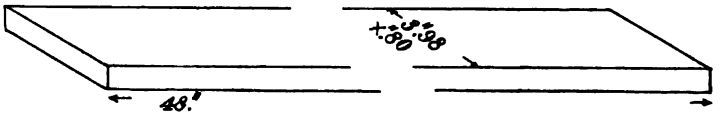
TENSILE TESTS OF WROUGHT-IRON BARS MADE FROM OREGON PIG-IRON.

[Specimens furnished by Col. J. McAllister, Benicia Arsenal, California. The label on the specimens from the Oswego Iron Company, Oswego, Oreg.]

Stated these bars were made from Oregon pig-iron, by Cooper, Hewitt & Co., Trenton, N. J., June 30, 1881.

No. 1661.

(Mark on bar: "No. 1, finished bar.")



Bar not straight; has short kinks.

Sectional area, 3.184 square inches.

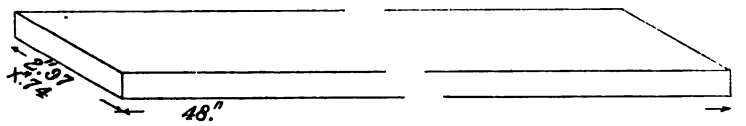
Gauged length, 15″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks,
Pounds.		*Inch*	*Inch.*	
3,184	1,000	0.		
31,840	10,000	.0005		Kinks in bar prevent the determination of the elongations.
47,760	15,000	—.0020		
63,680	20,000	(?)		
	1,000		(?)	
3,184	1,000	0.		Elongation measurements began anew.
63,680	20,000	.0070		
64,000		.0080		
66,000		.0090		
68,000		.0165		
70,000		.0348		
72,000		.0485		
74,000		.0570		
76,000		.0675		
78,000		.075		
80,000		.079		
82,000		.089		
84,000		.099		
86,000		.107		
88,000		.118		
90,000		.129		
154,300	48,460			Ultimate strength.
0	0	.70		= 4.6 per cent.

Area at fracture, 3″.90 × ″.77 = 3.003 square inches.
Contraction of area, 5.7 per cent.
Broke at face of holder dies.
Appearance of fracture, square granular.

No. 1662.

(Mark on bar: "No. 2, muck bar.")



Sectional area, 2.198 square inches.
Gauged length, 15″.

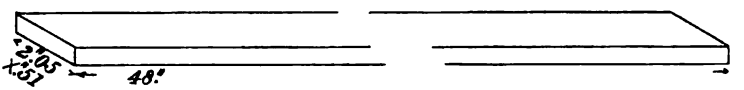
Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,198	1,000	.0		
21,980	10,000	.0050		
32,970	15,000	.0078		
43,960	20,000	.0135		
	1,000		.0041	
45,000		.0159		
46,000		.0169		
47,000		.0180		
48,000		.0198		
49,000		.0211		
50,000		.0228		
51,000		.0251		
52,000		.0288		
53,000		.0310		
54,000		.0338		
54,950	25,000	.0380		
	1,000		.0265	
56,000		.0450		
57,000		.0528		
58,000		.066		
59,000		.092		
60,000		.102		
62,000		.115		

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
64,000		.129		
66,000		.144		
68,000		.157		
70,000		.172		
88,700	40,350			Ultimate strength.
0	0	.32		=2.1 per cent.

Area at fracture, 2″.95 × ″.74 = 2.183 square inches.
Contraction of area, 0.7 per cent.
Square granular fracture radiating from a dull spot at middle of one edge.
Broke 4″ outside of gauged length.

No. 1663.

(Mark on bar: No. 3, muck bar.)



Sectional area, 1.045 square inches.
Gauged length, 15″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inches.*	*Inch.*	
1,045	1,000	0.		
10,450	10,000	.0041		
15,675	15,000	.0068		
20,900	20,000	.0092		
	1,000		−.0002	
21,000		.0094		
21,500		.0098		
22,000		.0100		
22,500		.0101		
23,000		.0106		
23,500		.0108		
24,000		.0110		
24,500		.0112		
25,000		.0115		
25,500		.0118		
26,000		.0120		
26,500		.0122		
27,000		.0126		
27,500		.0130		
28,000		.0130		
28,500		.0132		
29,000		.0135		
29,500		.0140		
30,000		.0142		
30,500		.0146		
31,000		.0149		
31,500		.0151		
32,000		.0156		
32,500		.0158		
33,000		.0161		
33,500	32,060	.0165		Elastic limit.
34,000		.0448		
34,500		.0810		
35,000		.19		
48,450	46,360			Ultimate strength.
0	0	1.28		= 8.5 per cent.

Area at fracture, 1″.88 × ″.43 = .808 square inches.
Contraction of area, 22.6 per cent.
Appearance of fracture, fibrous, with spongy center.

Chemical analyses made by Capt. John Pitman, United States Army.

	Oregon, No. 1.	Oregon, No. 2.	Oregon, No. 3.
Silicon	0.100	0.056	0.032
Phosphorus	0.264	0.078	0.044
Sulphur	0.016	0.004	0.004
Manganese	0.027	0.031	0.028
Copper	0.016	0.018	Trace.
Cobalt	0.052	0.050	0.053
Nickel	0.123	0.256	0.141
Combined carbon	0.037	0.333	0.307 or 0.313
Graphite	0.023	0.051	0.048
Total carbon	0.060	0.384	0.355 or 0.361
Slag, &c	2.55	0.44	0.30
Silica	0.12	0.07	0.06

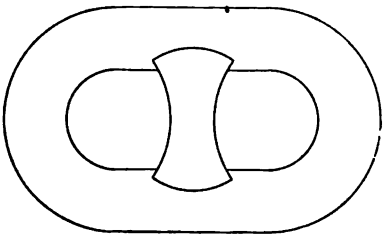
10.

TENSILE TESTS OF WROUGHT-IRON CHAIN CABLE.

[Specimens furnished by Commander W. S. Schley.]

Three links in each sample tested.

Style of links.



No. 4579.

(Cast-iron studs marked "Wharton Railroad Switch Company.")

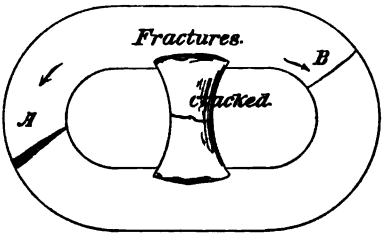
Diameter of iron, 2″.05; diameter at weld, 2″.10; length of link inside, about 7″; width, 3″.

End links secured in the testing machine with 2″ steel bars loop-shaped.

Ultimate strength of chain, 279,500 pounds = 42,350 pounds per square inch.

Fractured middle link at weld and at butt.

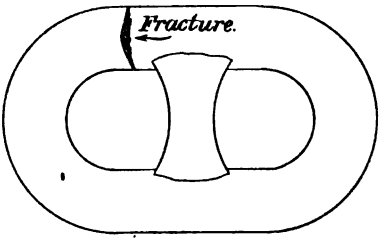
Fracture A granular with slight fibrous appearance. Fracture B granular 15 per cent., following weld, 85 per cent.



Corners of cast-iron stud flaked off and cracked at middle. Stud in one end link injured by flaking.

No. 4580.

Diameter of iron, 2″.01
Length of link inside, about 7″.00; width, 3¼″.
Ends secured with steel loops 2″ diameter.
Sharp snapping sounds heard at 157,000 pounds, which were repeated frequently under the advancing loads.
Ultimate strength, 196,600 pounds=31,010 pounds per square inch.

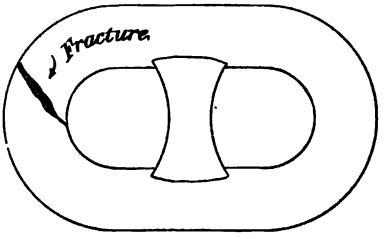
Fractured end link 

at quarter.

Appearance of metal granular at circumference about 20 per cent. with fibrous center.
Started weld in middle link at quarter.

No. 4581.

Diameter of iron, 2″.05.
Length of link inside about 10½″; width about 3¾″.
Diameter of link at weld and but enlarged to 2″.35.
Ultimate strength 177,350 pounds=26,870 pounds per square inch on minimum section of link.
Fractured end link. Took oblique course following weld. Metal fibrous.

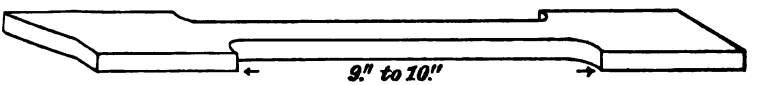


11.

TENSILE TESTS OF WROUGHT-IRON SPECIMENS.

[For James G. Hill, supervising architect, Washington, D. C.]

Form of specimens.



Number of test.	Mark on specimen.	Width.	Thickness.	Sectional area.	Elastic limit.		Ultimate strength.		Elongation in 8 inches.	
					Total pounds.	Pounds per square inch.	Total pounds.	Pounds per square inch.	Inches.	Per cent.
		Inches.	*Inch.*	*Sq.in.*						
2637	6 m.	1.017	.495	.503	17,100	34,000	25,300	51,100	1.69	21.1
2638	7 m.	1.016	.509	.517	17,650	34,140	26,350	50,970	1.63	20.4
2639	8 m.	.778	Diam.	.475	16,100	33,890	24,620	51,830	1.42	17.7
2640	9 m.	1.007	.514	.518	16,050	30,980	26,950	52,030	1.66	20.7
2641	10 m.	.968	.514	.498	15,400	30,920	26,050	52,310	1.64	20.5
2642	11 m.	1.225	.371	.454	14,980	33,000	21,950	48,350	1.11	13.9
2643	12 m.	1.208	.376	.454	14,300	31,500	21,840	48,110	1.04	13.0
2644	13 m.	1.337	.373	.499	16,200	32,460	23,270	46,630	.63	7.9
2645	14 m.	1.335	.371	.496	16,650	33,640	23,980	48,440	.85	10.6
2646	1 B.	.765	Diam.	.460	15,500	33,700	23,600	51,300	1.15	14.4
2647	2 B.	1.010	.515	.520	17,830	34,290	25,980	49,960	1.55	19.4
2648	3 B.	1.003	.511	.513	17,800	34,700	25,590	49 880	1.73	21.6
2649	4 B.	.990	.502	.497	16,150	32,490	24,540	49,380	1.64	20.5
2650	5 B.	.979	.500	.490	14,900	30,400	23,650	48,270	1.41	17.6
2651	6 B.	.985	.365	.360	12,380	34,390	17,890	49,690	1.28	16.0
2652	7 B.	.980	.359	.352	12,260	34,830	17,560	49,890	1.52	19.0
2653	8 B.	1.005	.396	.398	13,900	34,920	19,500	48,990	1.09	13.6
2654	9 B.	1.005	.396	.398	14,250	35,800	19,100	47,990	.80	10.0

Number of test.	Area at fracture.	Contraction of area.	Appearance of fracture.
	Sq. in.	*Per cent.*	
2637	.91 × .41 = .373	25.8	Fibrous, fine lamination.
2638	.91 × .42 = .382	26.1	Do.
2639	.60 diameter, .283	40.4	Fine fibrous.
2640	.90 × .42 = .378	27.0	Fibrous, laminated.
2641	.87 × .43 = .374	24.9	Fibrous, laminated, elastic limit not well defined.
2642	Broke in neck	.....	Fine fibrous, laminated.
2643	....do	.....	Do.
2644	....do	.....	Do.
2645	....do	.....	Do.
2646	.64 diameter, .322	30.0	Fibrous, seamy.
2647	Broke in neck....	.....	Fibrous, laminated.
2648	.87 × .42 = .365	28.8	Fibrous, slight lamination.
2649	.90 × .42 = .378	23.9	Fibrous, seamy.
2650	.90 × .42 = .378	22.8	Fibrous, laminated.
2651	.89 × .29 = .258	28.3	Fibrous, fine lamination.
2652	.88 × .31 = .273	22.4	Do.
2653	Broke in neck....	.....	Fibrous.
2654	.. do	.....	Do.

Number of test.	Mark on specimen.	Width.	Thickness.	Sectional area.	Elastic limit.		Ultimate strength.		Elongation in 10 inches.	
					Total pounds.	Pounds per square inch.	Total pounds.	Pounds per square inch.	Inches.	Per cent.
		Inches.		*Sq.in.*						
2655	A. 1.	.705	Diam.	.390	11,980	30,720	19,070	48,900	2.45	24.5
2656	A. 3.	.705	Diam.	.390	11,280	28,920	19,200	49,230	2.37	23.7
2657	A. 4.	.700	Diam.	.385	11,250	29,220	18,500	48,050	2.17	21.7
2658	B. 5.	.988	.506	.500	15,740	31,480	25,380	50,760	2.36	23.6
2659	B. 5..	1.007	.510	.514	15,980	31,090	25,730	50,060	1.78	17.8
2660	C. 6.	1.334	.400	.534	16,900	31,640	25,290	47,360	1.58	15.8
2661	C. 6.	1.327	.413	.548	16,300	29,740	24,690	45,050	1.09	10.9

Number of test.	Uniform elongation.	Area at fracture.		Contraction of area.	Appearance of fracture.
	Per cent.	*Inch.*	*Sq. in.*	*Per cent.*	
2655	23	.56 Diameter	= .246	36.9	Fine fibrous, seamy.
2656	22	.54 Diameter	= .229	41.3	Do.
2657	18	.54 Diameter	= .229	40.5	Do.
2658	*20	.86×.40	= .344	31.2	Fibrous, laminated.
2659	17	.92×.43	= .396	22.9	Fibrous, slight lamination.
2660	15	1.20×.35	= .420	21.3	Fibrous.
2661	8	1.20×.35	= .420	23.3	Fibrous, laminated.

*Approximate.

NOTE.—The elastic limit of 8-inch specimens is approximate only, a length of 10 inches being required for micrometer measurements.

Specimens C. 6 dressed on edges, L. 1 to L. 6 dressed all over.

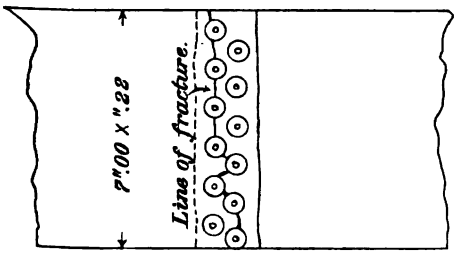
Number of test.	Marks on specimens.	Dimensions.		Sectional area.	Elastic limit.		Ultimate strength.	
		Width.	Thickness.		Total pounds.	Pounds per square inch.	Total pounds.	Pounds per square inch.
		Inches.	*Inch.*	*Sq. in.*				
1665	C. 6	1.325	.370	.490	14,100	28,770	24,080	49,140
1666	C. 6	1.325	.373	.494	14,150	28,640	24,280	49,150
1667	L. 1	Diam.	.703	.388	11,200	28,870	21,050	54,250
1668	L. 2	Diam.	.700	.384	11,500	29,950	19,430	50,600
1669	L. 3	1.010	.505	.510	16,100	31,570	25,550	50,100
1670	L. 4	1.006	.502	.505	15,050	29,800	25,780	51,050
1671	L. 5	1.006	.505	.508	13,700	26,970	23,150	45,570
1672	L. 6	1.003	.512	.514	15,300	29,770	24,810	48,270

Number of test.	Elongation in 8 inches.		Uniform elongation.	Area at fracture.		Contraction of area.	Appearance of fracture.
	Inches.	Per cent.		*Inches.*	*Sq. inches.*		
			Per cent.			*Per cent.*	
1665	1.43	17.9	18	1.22×.31	= .378	22.8	Fibrous lamellar.
1666	1.67	20.9	20	1.21×.30	= .363	26.5	Do.
1667	1.79	22.4	22	.61 Diameter	= .292	24.7	Do.
1668	1.96	24.5	22	.58 Diameter	= .264	31.2	Do.
1669	1.65	20.6	17	.90×.42	= .378	25.9	Do.
1670	1.36	17.0	15	.92×.43	= .396	21.6	Fibrous seamy.
1671	.86	10.8	11	Broke at neck.		.....	Spongy, stratified.
1672	1.15	14.4	13	.91×.46	= .419	18.5	Fibrous lamellar.

12.

TENSILE TEST OF LEATHER HOSE RIVETED JOINT.

No. 1655.



Twelve $\frac{3}{16}$-rivets.
Rivets have patent cup-shaped heads; flat burrs.
Ultimate strength 2,760 pounds.
Tore leather along five rivets burr side, and along two rivets on patent rivet head side.

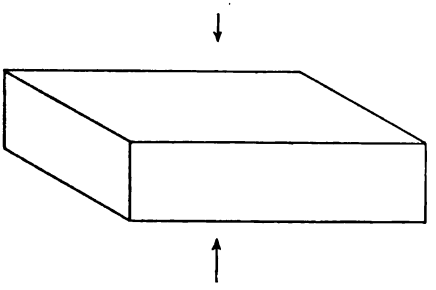
13.

COMPRESSION OF BRICKS.

[Samples from bricks used in the construction of built piers.]

Tested between flat-steel buttresses. Compressed surfaces ground approximately flat, with loose emery on a face plate.

TESTS OF FACE BRICKS. (EASTERN.)



Number of test.	Dimensions.			Compressed area.	Ultimate strength.		Remarks.
	Length.	Width.	Thickness.		Total pounds.	Pounds per square inch.	
	Inches.	*Inches.*	*Inches.*	*Sq. in.*			
4409	7·75	3·70	2·10	28·68	317,100	11,056	Brass packing used under corners to secure an even bearing.
4410	7·75	3·76	2·07	29·14	407,500	13,984	Packed under one corner.
4411	7·52	3·57	2·05	26·85	449,300	16,734	Packed along two edges.

No. 4409.

Began to flake near one end under 174,000 pounds.
Failed gradually under the maximum load.

No. 4410.

Snapping sound at 104,000 pounds, but no cracks in sight.
At 175,000 pounds flaked off at one corner.
At 234,000 pounds, one end flaked off.

No. 4411.

At 110,000 pounds flaked off at middle of one face.
At 237,000 pounds continued crushing along one face.

TESTS OF COMMON EASTERN BRICKS.

Number of test.	Dimensions.			Compressed area.	Ultimate strength.		Remarks.
	Length.	Width.	Thickness.		Total pounds.	Pounds per square inch.	
	Inches.	*Inches.*	*Inches.*	*Sq. in.*			
4412	8.12	3.50	2.07	28.42	562,300	19,785	Packed under two corners.
4413	7.90	3.56	2.15	28.12	628,500	22,351	Packed under three corners.
4414	8.10	3.62	2.12	29.32	381,000	12,995	Packed under two corners.

No. 4412.

Cracking sounds at 348,000 pounds pressure; no cracks in sight.
At 445,000 pounds first cracks appear, flaking off along one side.
Fractured suddenly after passing the maximum load.

No. 4413.

At 312,000 pounds cracked at corner.
At 405,000 pounds flaked off along edges.
Gradual failure after passing maximum load, reducing pressure to about 580,000 pounds, when sudden crushing occurred.

No. 4414.

At 95,000 pounds flaked off at end near corner.
Frequent flaking of specimen above load of 150,000 pounds.

TESTS OF (OLD) BAY STATE BRICKS.

Number of test.	Dimensions.			Compressed area.	Ultimate strength.		Remarks.
	Length.	Width.	Thickness.		Total pounds.	Pounds per square inch.	
	Inches.	*Inches.*	*Inches.*	*Sq. in.*			
4415	7.90	3.57	2.06	28.20	313,600	11,120	One corner packed, otherwise took an even bearing.
4416	7.78	3.70	2.02	28.79	365,900	12,709	Two corners packed.
4417	7.70	3.50	2.11	26.95	280,000	10,390	Took even bearings without packing.

No. 4415.

Began to flake off at end under 145,000 pounds pressure.
Opened cracks and flaked off at edges generally after passing 250,000 pounds.

No. 4416.

Began to flake at end near corner under 215,000 pounds pressure.

No. 4417.

Began to crack along one edge at 196,000 pounds.
At 258,000 pounds decided yielding occurred, the pressure remaining stationary about one minute. The brick then gave a higher resistance, the load increasing to 280,000 pounds, the maximum, after which gradual failure occurred.

14*b*.

COMPRESSION OF BRICKS.

[For General M. C. Meigs, superintending architect and engineer new pension building, Washington, D. C.]

[Bricks tested between cast-iron compression platforms. Compression faces of bricks, ground flat.]

Number of test.	Marks on brick.	Sectional area.	Bearings.	Ultimate strength.		Remarks.
				Total pounds.	Pounds per square inch.	
	W. H. West & Bro.:	*Inches. Sq. in.*				
2531	Red	4.00×8.50=34.00	Even	324,500	9,540	Cracking sounds heard at 183,000 pounds.
2532	Arch.	3.95×8.50=33.58	Uneven; ″.01 packing required.	255,200	7,600	Cracking sounds heard at 30,000 pounds. Fractures in sight at 80,000 pounds.
2533	Press	4.20×8.50=35.70	Even	231,000	6,470	Cracking sounds heard at 125,000 pounds. Cracks in sight at 150,000 pounds.
	Washington Brick Co.:					
2534	Red	4.10×8.47=34.73	Even	296,200	8,530	Crack in sight at 32,000 pounds at corner. At 130,000 pounds specimen covered; no more cracks in sight.
2535	Arch	3.80×8.30=31.54	do	324,500	10,290	Cracking sounds heard at 65,000 pounds. Specimen covered when load reached 150,000 pounds; no cracks in sight.
2536	Press	4.10×8.35=34.24	do	314,700	9,190	Cracking sounds heard at 68,000 pounds. Began to crack along edge at 110,000 pounds.
	Childs & Snow:					
2537	Red	4.15×8.40=34.86	Even	211,000	6,050	Began to flake along one corner at 78,000 pounds.
2538	Do	4.10×8.46=34.69	do	209,300	6,030	Began to flake off at edge at 107,000 pounds.
2539	Do	4.10×8.45=34.65	″.00½ packing under one corner.	232,000	6,700	Began to flake off at corner at 140,000 pounds.
2540	Arch	3.70×8.10=29.97	Even	203,700	6,800	Cracks appeared generally at 85,000 pounds.
2541	Press	4.20×8.40=35.28	do	210,200	5,960	Began to flake at one edge at 110,000 pounds.
	Burns, Russell & Co.:					
2542	Press	4.30×8.58=36.89	Even	249,000	6,750	Cracking sounds at 128,000 pounds. Cracks in sight at 140,000 pounds.

14.

a

COMPRESSION OF MANUFACTURED STONE.

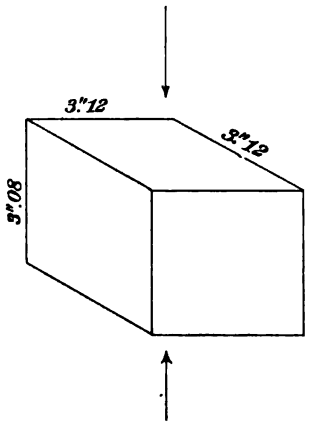
[For General M. C. Meigs, superintending architect and engineer new Pension building, Washington, D. C.]

Specimen of fractured stone from the Flintolithic Stone and Marble Company, New York.

Said to be composed of Portland cement, crushed granite, or other stone, and a solution known to the manufacturers.

Stone marked in ink: Flintolithic, 206.8 pounds per cubic foot, June 21, 1883.

No. 4588.



Sectional area (compressed surface, 9.73 square inches).

Weight, 15,925 grains.

Specific gravity computed from weight and measurements, 2.10.

Weight per cubic foot, 131 pounds.

Compressed faces ground flat with loose emery on a face plate. Tested between flat steel platforms.

Ultimate crushing strength, 15,450 pounds=1,588 pounds per square inch.

The specimen burst into fragments under the maximum load, one principal piece being pyramidal shaped.

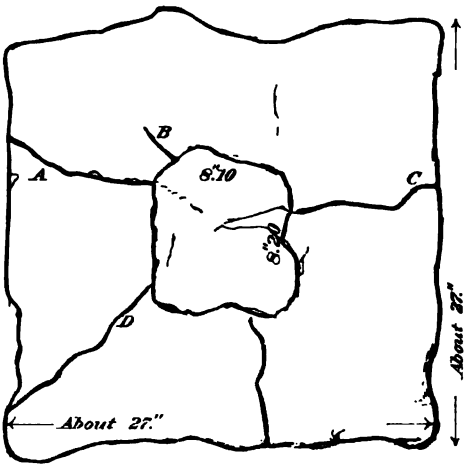
15.

SHEARING TEST OF CONCRETE FOR WASHINGTON MONUMENT.

[Specimen furnished by Col. Thomas Casey.]

No. 738.

Approximate dimensions of block, 27″ × 27″ × 8″ thick.
Cast-iron punch, 8″.1 × 8″.2
Cast-iron die, 24″ × 24, having an opening 10″ × 10″.
Punch and die have planed surfaces.



Faces of concrete rough, taking uneven bearings. Maximum opening on punch side about ″.15. Maximum opening on die side about ″.25. Tested without packing or cushions.

Under 80,000 pounds' compression on punch, crack A appeared. Loads gradually increased to the maximum, 89,000 pounds.

Strains were continued, the load on the specimen falling to 40,000 pounds, developing cracks B, C, and D.

Test discontinued when the load had fallen to 30,000 pounds. The punch at this time gradually shearing the concrete and increasing the radial cracks.

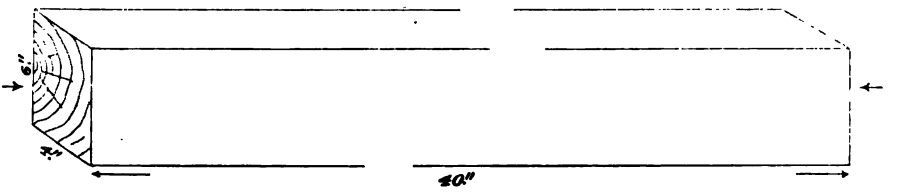
16.

TESTS OF CALIFORNIA LAUREL WOOD BY COMPRESSION, INDENTATION, SHEARING, TRANSVERSE TENSION.

[Specimens furnished by Col. J. McAllister, Benicia Arsenal, California.

COMPRESSION TESTS.

Shape of specimens.



No. 4380.

Specimen marked "white laurel."

Sectional area, 24 square inches.
Average rate of growth, 20 rings per inch.
Specific gravity, .7080.
Ganged length, 20".

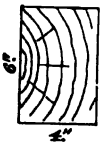
Loads applied.	Compression.	Compression sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.		
10,000	.0021		
1,000		.0008	
20,000	.0059		
1,000		.0009	
30,000	.0097		
1,000		.0009	
40,000	.0134		
1,000		.0009	
50,000	.0170		
1,000		.0009	
60,000	.0206		
1,000		.0010	
70,000	.0241		
1,000		.0010	
80,000	.0280		
1,000		.0010	
90,000	.0320		
1,000		.0012	
100,000	.0360		
1,000		.0014	
110,000	.0405		
1,000		.0015	
120,000	.0442		
1,000		.0018	
130,000	.0490		
1,000		.0021	
140,000	.0535		
1,000		.0027	
150,000	.0587		
1,000		.0035	
160,000	.0642		
1,000		.0045	
170,000	.0740		
1,000		.0068	
180,000	.0920		Ultimate strength=7,500 pounds per square inch.
1,000		.0153	
178,300			Rapid crushing of fibers.

Fibers crushed 6" from middle.

No. 4381.

(Specimen marked "white laurel.")

Sectional area (4″ × 6″), 24 square inches.
Average rate of growth, 14 rings per inch.
Specific gravity, .7190
Gauged length, 20″.

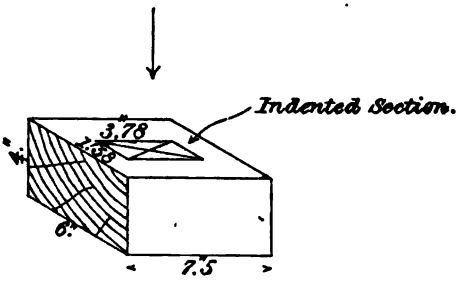


Loads applied.	Compression.	Compression sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.		
10,000	.0036		
1,000		0.	
20,000	.0071		
1,000		0.	
30,000	.0109		
1,000		0.	
40,000	.0140		
1,000		0.	
50,000	.0175		
1,000		0.	
60,000	.0210		
1,000		.0001	
70,000	.0245		
1,000		.0002	
80,000	.0281		
1,000		.0002	
90,000	.0320		
1,000		.0003	
100,000	.0359		
1,000		.0006	
110,000	.0401		
1,000		.0010	
120,000	.0440		
1,000		.0011	
130,000	.0482		
1,000		.0013	
140,000	.0532		
1,000		.0020	
150,000	.0576		
1,000		.0025	
160,000	.0641		
1,000		.0039	
170,000	.0726		
1,000		.0077	
180,000	.1011		Ultimate strength, 7,500 pounds per square inch.
1,000		.0205	
178,300			Rapid crushing of fibers.

Fibers crushed 10″ from end of specimen.

INDENTATION TESTS OF WHITE LAUREL.

Shape of blocks indented.



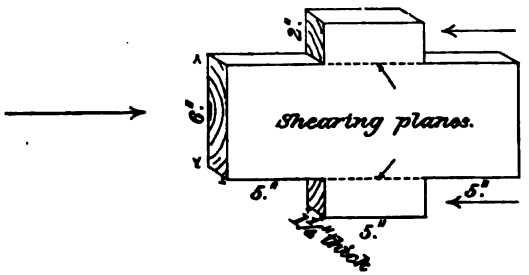
Indented area, 5.97 square inches.

Number of test.	Direction of loading.	Loads for indentations of—						
		″.01	″.02	″.03	″.04	″.05	Pounds per square inch.	″.06
4382	→	3.940	8.360	11.400	13.280	14.340	= 2.400	14.950
4383	→	4.180	10.200	14.880	17.550	18.580	= 3.110	18.960

Number of test.	Loads for indentations of—						Effect of load on specimen
	″.07	″.08	″.09	″.10	″.15	″.20	
4382	15.450	15.810	16.200	17.080	19.250	21.000	Sheared fibers, split at end.
4383	19.670	19.940	20.300	21.070	23.070	24.460	Sheared fibers.

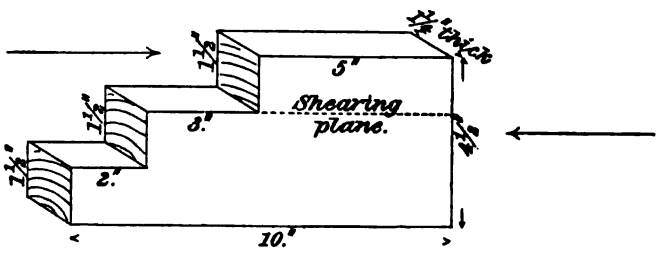
SHEARING (PARALLEL TO GRAIN) TESTS OF WHITE LAUREL.

Shape of specimens.



Number of test.	Shearing area.	Ultimate shearing strength.		Remarks.
		Total pounds.	Pounds per square inch.	
	Sq. inch.			
4384	12.5	13,860	1.110	Did not shear simultaneously in both planes.
4385	12.5	18,190	1.460	Sheared both planes simultaneously.

Shape of specimens.



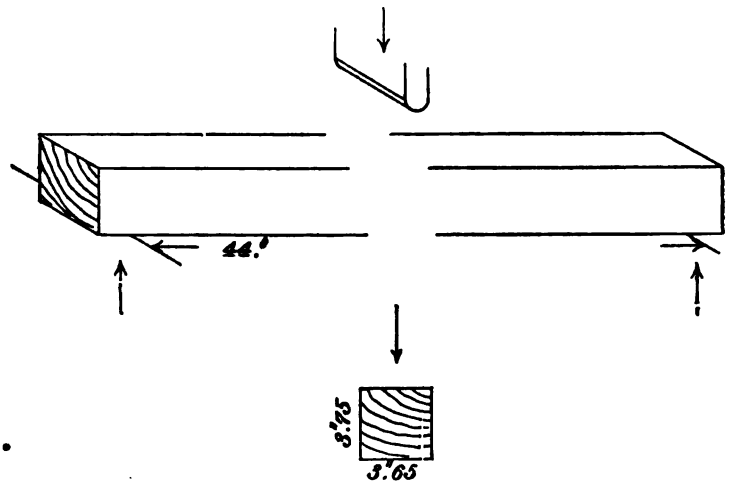
Number of test.	Shearing area.	Ultimate shearing strength.		Remarks.
		Total pounds.	Pounds per square inch.	
	Sq. inch.			
4386	6.26	5,580	890	
4387	6.30	4,860	770	Grain of specimen wavy.

TRANSVERSE TESTS.

Specimens supported with end bearings 44″ apart, loaded at the middle.

Middle bearing 1″ wide, with corners rounded ½″ radius. Deflections measured at middle.

Shape of specimens.



No. 4388.

Specific gravity, .689.
Rings per inch, 15.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
0.	0.	.....	
500	.04	.....	
1,000	.06½	.....	
1,500	.09½	.....	The modulus of rupture (R) for transverse loads computed by the formula $R=\frac{6\ PL}{4\ bd^2}$
2,000	.12	.....	
1,000	.....	.00½	
2,500	.15	.....	
3,000	.18	.....	
3,500	.21	.....	
4,000	.24	.....	
1,000	.....	.00½	
4,500	.27½	.....	
5,000	.30	.....	
5,500	.34	.....	
6,000	.36½	.....	
1,000	.....	.04½	
6,500	.40	.....	
7,000	.43	.....	
7,500	.47	.....	
8,000	.50	.....	
1,000	.....	.07½	
8,500	.55	.....	
9,000	.59	.....	
9,500	.64½	.....	
10,000	.71	.....	Ultimate strength R = 13,070.

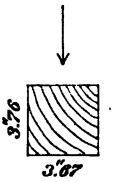
Fractured suddenly while load was being relieved, preparatory to taking the set under 1,000 pounds load.

Coarse splintering fracture at one corner of tension side. Short, brittle fracture, 1″.25, at other corner, opposite middle bearing. Split along the grain.

Indentation at middle bearing, ″.01½.

Indentation at end bearings, .01½.

No. 4389.



Total length, 48″.

Specific gravity, .689.

Rings per inch, 15.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.03	.....	
1,000	.05	.....	
1,500	.07	.....	
2,000	.09	.....	
1,000	.....	0.	
2,500	.11	.....	
3,000	.14	.....	
3,500	.17	.....	
4,000	.19½	.....	
1,000	.....	.00½	
4,500	.22½	.....	
5,000	.25	.....	
5,500	.28	.....	
6,000	.30½	.....	
1,000	.....	.01	
6,500	.34	.....	
7,000	.37	.....	
7,500	.40	.....	
8,000	.44	.....	
1,000	.....	.02½	
8,500	.47½	.....	
9,000	.51	.....	
9,500	.56	.....	
10,000	.61	.....	
1,000	.....	.07	
10,500	.68	.....	
11,000	.77	.....	
11,500	.89	.....	
12,000	1.00	.....	
1,000	.....	.24	
12,360	.....	.....	Ultimate strength R=16,060.

Sudden fracture. Coarse splintering on tension side; fibers crushed at middle bearing.

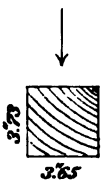
Indentation at middle bearing, ″.09.

Indentation at end bearings, ″.01.

NOTE.—Specimens Nos. 4380 to 4389, inclusive, were from the same stick; the original dimensions of which were 10″ × 10″ by 48″ long. Stick marked "White Laurel."

No. 4390.

(Marked "White Laurel.")



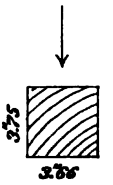
Total length, 48″.03.
Specific gravity, .664.
Rings per inch, 20.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.02		
1,000	.04		
1,500	.06½		
2,000	.09		
1,000		0.	
2,500	.11		
3,000	.14		
3,500	.16½		
4,000	.19		
1,000		.00½	
4,500	.21½		
5,000	.24		
5,500	.27		
6,000	.30		
1,000		.01½	
6,500	.32½		
7,000	.35½		
7,500	.38		
8,000	.41½		
1,000		.03	
8,500	.45		
9,000	.48½		
9,500	.52		
10,000	.56		
1,000		.06	
10,500	.60		
11,000	.64½		Ultimate strength, R = 13,990.

Sudden fracture. Square break at one corner of tension side, extending to the neutral axis; one corner of tension side did not fracture.
Indentation at middle bearing, ″.01.
Indentation at end bearings, ″.01½.

No. 4391.

(Marked "white laurel.")



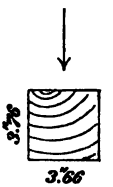
Total length, 48″.00.
Specific gravity, .655.
Rings per inch, 16.
$\frac{3}{8}$″ knot at corner of tension side opposite middle bearing.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.02	.....	
1,000	.05	.....	
1,500	.08	.....	Slight cracking at knot on tension side.
2,000	.10½	.....	
1,000	.....	0.	
2,500	.13½	.....	
3,000	.16	.....	
3,500	.19	.....	
4,000	.22	.....	
1,000	.....	.01	
4,500	.25	.....	
5,000	.27½	.....	
5,500	.31	.....	
6,000	.34½	.....	
1,000	.....	.02½	
6,500	.37½	.....	
7,000	.42	.....	
7,500	.63	.....	Ultimate strength, R = 9,620.

Fractured at the $\frac{3}{8}$″ knot on tension side.
Indentation at middle and end bearings, ″.01.

No. 4392.

(Marked "white laurel.")



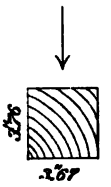
Total length, 48″.10.
Specific gravity, .664.
Rings per inch, 12.
$\frac{5}{8}$″ knot 4″ from middle on tension side.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pound.	*Inch.*	*Inch.*	
500	.08		
1,000	.06		
1,500	.09½		
2,000	.13		
1,000		.00½	
2,500	.16½		
3,000	.20		
3,500	.24		
4,000	.27		
1,000		.02	
4,500	.30½		
5,000	.34		
5,500	.38		
6,000	.42		
1,000		.02½	Split at knot and along grain, reducing the effective depth of the beam to about 2¾″ at the middle.
6,460			Ultimate strength, R = 8.480.
6,500	.92		
6,650			

Indentation at bearings, middle, ″.01; ends, ″.01½.
Failed at the knot on tension side.

No. 4393.

(Marked "white laurel.")



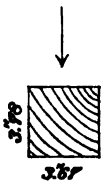
Total length, 48".03.
Specific gravity, .653.
Rings per inch, 14.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.02		
1,000	.04½		
1,500	.07		
2,000	.09		
1,000		.0	
2,500	.11½		
3,000	.13½		
3,500	.16		
4,000	.18		
1,000		.00½	
4,500	.21		
5,000	.23½		
5,500	.26		
6,000	.28		
1,000		.00½	
6,500	.30½		
7,000	.34		
7,500	.36		
8,000	.39		
1,000		.02	
8,500	.42		
9,000	.45		
9,500	.49		
10,000	.52		
1,000		.04	
10,500	.55		
11,000	.59		
11,500	.64½		
12,000	.69½		
1,000		.08½	
12,500	.74½		
13,000	.82		
13,100			Splintered at corner tension side.
13,500	.95		
14,000	1.10		Splintered on tension side, across face.
14,500			Ultimate strength, R = 18,440.

Coarse splintering fracture on the tension side; split along the neutral axis; fibers crushed at middle bearing.
Indentation at bearings, middle ".10; ends, ".02.

No. 4394.

(Marked "yellow laurel.")



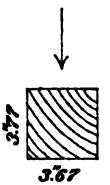
Total length, 48″.03.
Specific gravity, ″.623.
Rings per inch, 15.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.02½		
1,000	.05		
1,500	.07½		
2,000	.10		
1,000		.00½	
2,500	.12½		
3,000	.16		
3,500	.18		
4,000	.21		
1,000		.00½	
4,500	.24		
5,000	.26		
5,500	.29½		
6,000	.32		
1,000		.01	
6,500	.35		
7,000	.38		
7,500	.41		
8,000	.44		
1,000		.02½	
8,500	.47½		
9,000	.51		
9,500	.55		
10,000	.59		
1,000		.05	
10,500	.64		
11,000	.69½		
11,500	.77		
11,960			Ultimate strength, R = 15,050.

Fractured suddenly; coarse splintering on tension side; fibers crushed at middle bearing.
Indentation at bearings, middle, ″.05; ends, ″.03 and ″.02.

No. 4395.

(Marked "yellow laurel.")



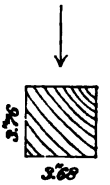
Total length, 48″.03.
Specific gravity, .625.
Rings per inch, 15.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.02	.....	
1,000	.05	.....	
1,500	.07	.....	
2,000	.09½	.....	
1,000	.....	—.01	
2,500	.12	.....	
3,000	.15	.....	
3,500	.17½	.....	
4,000	.20	.....	
1,000	.....	0.	
4,500	.23	.....	
5,000	.25½	.....	
5,500	.28½	.....	
6,000	.32	.....	
1,000	.....	.01	
6,500	.34½	.....	
7,000	.37½	.....	
7,500	.41	.....	
8,000	.44	.....	
1,000	.....	.02	
8,500	.49	.....	
9,000	.52½	.....	
9,500	.57	.....	
10,000	.62½	.....	
1,000	.....	.06½	
10,480	.....	.....	Ultimate strength, R = 13.260

Fractured suddenly. Short, brittle fracture on the tension side.
Indentation at bearings, middle, ″.04; ends, ″.01½.

No. 4396.

(Marked "yellow laurel.")



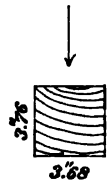
Total length, 48″.03.
Specific gravity, .617.
Rings per inch, 17.

Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.03		
1,000	.05		
1,500	.08		
2,000	.12		
1,000		.01	
2,500	.15		
3,000	.17½		
3,500	.20½		
4,000	.23½		
1,000		.02	
4,500	.27		
5,000	.30		
5,500	.32½		
6,000	.36		
1,000		.02½	
6,500	.39		
7,000	.42½		
7,500	.46		
8,000	.49		
1,000		.03	
8,500	.53		
9,000	.56		
9,500	.60		
10,000	.65		
1,000		.05	
10,100			Ultimate strength, R = 12.810.

Fractured suddenly. Coarse, splintering, oblique fracture, beginning at corner of tension side.
Indentation at bearings, middle, ″.01; ends, ″.01½.

No. 4397.

(Marked "yellow laurel.")



Total length, 48″.03.
Specific gravity, .598.
Rings per inch, 17.

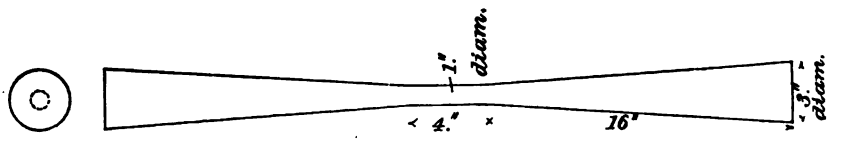
Loads applied.	Deflections.	Deflection sets.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.02½	.....	
1,000	.05½	.....	
1,500	.08	.....	
2,000	.10½	.....	
1,000	.....	0.	
2,500	.14	.....	
3,000	.17½	.....	
3,500	.20	.....	
4,000	.23	.....	
1,000	.....	.01½	
4,500	.26	.....	
5,000	.29	.....	
5,500	.32½	.....	
6,000	.36	.....	
1,000	.....	.01½	
6,500	.39	.....	
7,000	.43	.....	
7,500	.47	.....	
8,000	.50	.....	
1,000	.....	.04½	
8,500	.54½	.....	
9,000	.59½	.....	
9,500	.65	.....	
9,960	.....	.....	Ultimate strength, R = 12.688.

Fractured suddenly. Short brittle fracture, beginning 5″ from middle on tension side, extending obliquely 3″ deep.

Indentation at bearings, middle ″.01½, end ″.01½.

TENSILE TESTS.

Form of specimens.



Number of test.	Mark on specimen.	Diameter.	Sectional area.	Tensile strength.		Description of fracture.
				Total pounds.	Pounds per square inch.	
		Inches.	*Sq. in.*			
3012	White laurel..	1.00	.785	15,100	19,230	Brittle fibrous.
3013	....do	1.00	.785	15,700	20,000	Do.
3014	....do	1.02	.817	22,600	27,660	Long brittle, fibrous 40 per cent.
3015	Yellow laurel.	1.02	.817	14,700	17,990	Brittle, cross-grained 40 per cent. sheared.
3016	....do	1.02	.817	8,850	10,830	Square brittle.
3017	....do	1.01	.801	22,800	28,460	Irregular brittle, taking place where specimen was about 1′.15 diameter.

* Sharples, S. P.

17.

TESTS OF NORTH AMERICAN WOODS.

The collection of these specimens and their preparation for testing was done under the supervision of Prof. C. S. Sargent, in charge of the forestry division of the Tenth Census.

The specimens were taken from the trunks of the trees, none of which had been cut within two years of the time of testing. In the mean time, the test pieces had been seasoning in a dry cool building, dressed to nearly or quite the finished sizes. The standard size being 1″.575 × 1″.575 by about 43″.3 long.

Each stick had marked upon its end a distinguishing number; all specimens from the same tree having the same number.

Referring to these numbers, data furnished by Professor Sargent gave the botanical and common names of the wood, the locality and soil in which it was grown, and, when known, the diameter of the tree, and proportions of heart and sapwood.

TRANSVERSE TESTS.

[Description of, and details of results, in table 1.]

Sticks supported at the ends and loaded at the middle.

Size of specimens.

Breadth, 1″.575.
Depth, 1″.575.
Length between end supports, 39″.37.

The end bearings rested against the weighing platform of the testing machine.

Loading was done by means of a plunger, which had a semicircular face of ½″ radius extending across the width of the specimen.

The plunger was secured to the piston of the hydraulic straining press.

While being tested the sticks were in a vertical position.

Loads were applied in increments of 110 pounds or 111 pounds each. After 441 pounds had been sustained, the load was entirely removed, and the set determined. Then followed the regular increments of load from 441 pounds till fracture occurred.

Deflections were measured by the movement of a straight-edge in contact with the tension side of the specimen at the middle. The straight-edge was moved by the specimen over a graduated beam, where the deflections were directly read off.

When more than one stick from a tree was tested, or when the same stick was tested in other directions than transversely, one of the first four letters of the alphabet is used in connection with distinguishing number of the specimen.

Thirty larger specimens were tested and are recorded after the tabulation of the above sticks. These were 3″.15 in breadth by 3″.15 in depth, with the end bearings 39″.37 apart, as before. The middle plunger had a face 1″ wide, with the corners rounded to about ¼″ radius.

The specific gravities were computed from weights and measurements of the sticks taken by Mr. S. P. Sharples, special agent Tenth Census.

The yearly rings of growth were counted when practicable and the average number per inch recorded. In some specimens the rings were not sufficiently well defined to admit of a correct count.

In the column headed "direction of loading" are end views showing the rings; the arrow indicating the direction with reference to the rings in which the loads were applied.

In a number of cases the deflection sustained by the specimen at the time of reaching the highest load is given in the column headed "maximum deflection."

The modulus of rupture (R) was computed by the formula $R=\frac{3\,P\,l}{2\,b\,d^2}$.

Where

P = load in pounds applied at the middle.

l = length between end supports in inches.

b = breadth in inches.

d = depth in inches.

The fractures are described by stating, first, the effect of the test on the stick at the tension side, then the effect on the compression side, followed by other remarks upon such features as were observed.

The average time of making a test was eight minutes.

In a few instances only did the sticks recover their original position after the load of 441 pounds—a slight permanent set being generally recorded. This may have been due to the end bearings seating themselves slightly into the wood. In other cases the sets were temporary, and would have in part, if not altogether, disappeared in time.

The sets were taken soon as the loads had been released. Owing to the sluggish recovery of the wood it did not at first return to its full amount, the fibers requiring more time than was allowed them in which to complete the rearrangement.

During this series of tests there were frequent illustrations of the want of homogeneity in the specimens. Some specimens were apparently seriously splintered on the tension side before reaching the maximum load. The load which they sustained gradually increasing, notwithstanding the fractures which had taken place. In other cases the starting of the fractures would be accompanied by a sudden increase of deflection, after which the deflections would proceed uniformly as the loads increased. An extreme case of this kind is found in specimen 235*b* (Osage Orange), which fractured on the tension side about 15 per cent. of the fibers of total cross-section, notwithstanding which the specimen still sustained within 32 pounds its maximum load.

The behavior of certain sticks under transverse stress shows a spiral movement similar to that observed in full-sized mill-posts tested by compression parallel to the grain—the spiral movement about their axes taking place while under stress. Transverse specimens were observed which at first took good bearings, but as the test proceeded began to twist, concentrating the load at the corners of the stick, the twist amounting in some cases to five degrees in a length of 39″.37.

Specimens that were badly warped in seasoning before the test, gave lower results than other specimens from the same tree. These facts, taken in connection with the variations in strength developed by sound specimens alike in appearance, cut from the same tree, show the decided lack of uniformity in strength of timber. What is conspicuous in a small specimen is, of course, exaggerated in a larger one.

It was the purpose to test the specimens as nearly alike as possible, in order to obtain comparable results. Allowing more time for each test, lower results would have been found. Several specimens which

had been loaded with 441 pounds, and the set determined fractured before reaching that load upon its second application.

Fractures on the compression side of some sticks were found resembling in appearance the lines produced on surfaces of iron and steel bars by tension. With iron and steel tensile pieces diagonal lines of scale start off after the elastic limit has been passed; frequently these diagonal lines of scale will form, running in different directions, often intersecting. The intersecting ("Cooper") lines of failure by crushing were observed on the surfaces of a number of the wood specimens.

The sticks 1″.575 × 1″.575 when straight grained, sound and free from large knots, generally failed by crushing at the middle on the compression side, splintering on the tension side if tough, or separating the fibers with a square or irregular fracture if brittle, at the same time splitting parallel to the grain at or near the neutral axis.

Several fractions of the 3″.15 by 3″.15 sticks occurred by shearing along the neutral axis from the middle to the end of the specimen.

TABLE 1.—TRANSVERSE TESTS.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
346a	.7051	.....		.181	.402	.630	.898	.063	.886	1.201	1.555	2.150
346b	.7006	.....		.217	.458	.658	.921	.079	.929	1.236	1.595	.....
354a	.5222	.....		.197	.413	.630	.854	.039	.866	1.181	1,752	.....
354b	.5028	.....		.197	.429	.658	.945	.091	.945	1.240	2.000	.....
246a	.5000	.....		.213	.362	.571	.787	.039	.787	1.134	1.811	.....
246b	.4756	.....		.205	.417	.669	.945	.075	.984	1.327	.....	.....
261	.4862	17		.244	.524	.843	1.350	.189	1.466	.....	.....	.....
261_1	.4564	15		.264	.532	.827	1.252	.124	1.299	.....	.....	.....
534a	.5682	10		.181	.366	.571	.787	.039	.787	1.063	.....	.....
534b	.5852	8		.173	.354	.539	.756	.028	.756	1.024	1.378	2.126
1178a	.4318	12		.217	.445	.681	1.028	.079	1.063	.....	.....	.....
1178b	.4625	12		.193	.378	.598	.866	.055	.906	1.276	.....	.....
532a	.5807	19		.161	.354	.543	.756	.039	.768	.....	.....	.....
532b	.5579	20		.154	.307	.457	.622	.012	.622	.819	1.122	1.575
266_1	.4170	10		.240	.472	.764	1.213	.177	1.276	.....	.....	.....
266_2	.5051	8		.287	.571	.906	1.370	.157	1.425	2.598	.....	.....
260_1	.5688	12		.205	.394	.567	.772	.039	.787	1.035	1.465	.....
260_2	.5103	11		.217	.421	.646	.972	.079	1.004	1.449	.....	.....

TABLE 1.—TRANSVERSE TESTS.

Deflections for loads in pounds of—					Maximum deflection.	Ultimate strength.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
						772	11.760	Long, oblique.
						718	10.950	Fracture started tension side.
						708	10.800	Short break, split along grain. Fibers crushed.
						675	10.290	Short break, split along grain Cracks from middle to ends along neutral axis.
						661	10.080	Fine, splintering. Fibers crushed.
						625	9.530	Do.
						540	8.230	Do.
						488	7.440	Splintering. Slight crushing.
						675	10.290	Broke at knot, middle of stick.
						790	12.050	Long, splintering. Fibers crushed.
						530	8.080	Short, brittle.
						600	9.150	Long, oblique.
						480	7.320	Broke at knot. Cross-grained.
						825	12.580	Fine, splintering. Fibers crushed.
						520	7.930	Do.
						576	8.780	Splintering fracture. Broke at small knots.
						760	11,590	Fine, splintering. Fibers crushed. Sapwood.
						567	8.640	Oblique. Cross-grained.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
395	.4174	20		.315	.630	1.024	.....	.....	.....	.....	.....	.....
1231a	.4705	4		.197	.394	.591	.811	.020	.815	1.102	1.484	.....
1231b	.4911	4		.209	.382	.567	.787	.020	.807	1.016	1.346	1.969
1231c	.4619	6		.197	.402	.598	.811	.020	.811	1.063	1.484	.....
1232a	.4381	20		.236	.458	.709	.....	.....	.....	.....	.....	.....
1232b	.4511	18		.197	.374	.551	.756	.020	.764	1.000	1.417	.....
1232c	.4550	16		.213	.417	.618	.846	.024	.866	1.181	.....	.....
1236a	.4614	.....		.236	.461	.630	.866	.039	.882	1.240	.....	.....
1236b	.4697	25		.220	.433	.630	.906	.055	.925	1.209	.....	.....
1236c	.4591	5		.217	.458	.689	1.047	.079	1.063	.....	.....	.....
1237	.4367	.....		.224	.453	.677	1.063	.098	1.102	.....	.....	.....
1238	.4461	.....		.197	.394	.598	.874	.059	.882	1.344	.....	.....
818a	.4930	12		.177	.327	.472	.661	.016	.665	.965	1.339	.....
818b	.4809	13		.177	.366	.563	.787	.028	.795	1.134	.....	.....
211a	.3634	19		.433	.945	.....	.....	.....	.....	.....	.....	.....
21 b	.3575	19		.532	1.220	.....	.....	.....	.....	.....	.....	.....
332	.4523	16		.276	.532	.850	{1.220} {1.229}	.114	1.811	.....	.....	.....
479a	.5705	7		.354	.748	1.220	1.988	.394	2.181	3.701	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
.....	.....	.....	.....	.....	.....	440	6.710	Short, brittle.
.....	.....	.....	.....	.....	1.969	698	10.643	Irregular, brittle, 1".2 deep. Cracks along grain 12" in length.
.....	.....	.....	.....	.....	1.969	772	11.756	Brittle, splintering. Split along grain 18". Slight crushing.
.....	.....	.....	.....	.....	2.008	709	10,810	Short, brittle, 1".2 deep. Split along grain 17". Fibers crushed.
.....	.....	.....	.....	.....	.....	430	6.560	Square, brittle, breaking at knot middle of stick.
.....	.....	.....	.....	.....	1.575	690	10.370	Long, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	620	9.450	Splintered in vicinity of knot, 3" from middle. Fibers crushed.
.....	.....	.....	.....	.....	.....	652	9.940	Short, brittle, ".4 deep. Fibers crushed. Split along neutral axis.
.....	.....	.....	.....	.....	.....	606	9.240	Oblique, splintering, 18" long, separating stick.
.....	.....	.....	.....	.....	.....	548	8.360	Long, oblique, beginning at corner. Fibers crushed.
.....	.....	.....	.....	.....	.....	550	8.390	Square, brittle, separating stick at middle. Open porous wood.
.....	.....	.....	.....	.....	.....	592	9.120	Short, brittle, 1¼" deep. Fibers crushed.
.....	.....	.....	.....	.....	.....	710	10.830	Fine, splintering. Fibers crushed at and 3" from middle.
.....	.....	.....	.....	.....	.....	635	9.680	Do.
.....	.....	.....	.....	.....	.....	294	4.480	Brittle, split along grain. Worm eaten.
.....	.....	.....	.....	.....	.....	272	4.150	Brittle, oblique, split along grain. Worm eaten.
.....	.....	.....	.....	.....	.....	540	8.230	Brittle, splintering, split along neutral axis. Season cracks entire length of stick. Cross-grained.
.....	.....	.....	.....	.....	.....	590	9.000	Short break. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			⟹	In.	In.	In.	In.	In.	In.	In.	In.	In.
479b	.5794	7		.362	.787	1.280	2.028	.394	2.138	2.286	.....	.....
1131a	1.1285	About 50		.177	.354	.539	.728	.089	.768	.984	1.220	1.496
1131b	1.0857	...do		.177	.335	.492	.689	.092	.701	.866	1.102	1.339
236a	.4843	12		.268	.562	.846	1.260	.118	1.280	.....	.....	.....
236b	.4729	12		.244	.504	.787	1.150	.098	1.181	1.575	.....	.....
414a	.5470	7		.217	.417	.642	.926	.047	.983	1.220	1.732	.....
414b	.5605	7		.256	.500	.768	1.063	.079	1.110	1.457	2.284	.....
2a	.4601	.....		.236	.492	.799	1.260	.157	1.339	.....	.....	.....
1039a	.4492	7		.276	.528	.878	1.350	.157	1.417	.....	.....	.....
1039b	.4287	5		.287	.602	1.039	1.988	.512	.....	.....	.....	.....
252a	.4667	10		.197	.394	.650	.953	.087	1.004	1.457	.....	.....
252b	.5498	10		.185	.374	.551	.764	.089	.780	1.020	1.319	.....
316a	.4517	15		.217	.433	.681	1.087	.138	1.161	.....	.....	.....
745a	.4702	5		.228	.461	.728	1.126	.138	1.205	.....	.....	.....
745b	.4555	6		.236	.468	.740	1.122	.118	1.185	.....	.....	.....
285_1	.4016	8		.276	.606	.969	.....	.....	.....	.....	.....	.....
285_2	.3942	11		.256	.532	.799	1.220	.138	1.328	.....	.....	.....
285_3	.3926	11		.232	.472	.728	1.165	.138	1.232	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	551	8.400	Short break.
.....	.....	.....	.....	.....	.....	859	12.960	Oblique, ragged, cross-grained and curly. A sap.
1.654	1.969	.....	.....	.....	.....	1,080	16.470	Do.
.....	.....	.....	.....	.....	.....	470	7.170	Oblique, broke at knot 4″ from middle.
.....	.....	.....	.....	.....	.....	640	9.750	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	728	11.100	Do.
.....	.....	.....	.....	.....	.....	685	10.440	Splintering one corner. Fibers crushed.
.....	.....	.....	.....	.....	.....	525	8.160	Short, splintering. Fibers crushed. Opened crack along grain.
.....	.....	.....	.....	.....	.....	520	7.980	Short, break. Fibers crushed. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	441	6.720	Short, brittle. Fibers crushed. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	580	8.840	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	756	11.530	Do.
.....	.....	.....	.....	.....	.....	495	7.550	Do.
.....	.....	.....	.....	.....	.....	535	8.160	Short, splintering. Fibers crushed at middle, and 3″ from middle at knots.
.....	.....	.....	.....	.....	.....	515	7.850	Splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	380	5.790	Short, square break.
.....	.....	.....	.....	.....	.....	495	7.550	Do.
.....	.....	.....	.....	.....	.....	510	7.780	Short, square break. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings, per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
320a	.4750	15		.177	.354	.539	.748	.028	.768	1.024	1.555	.....
320b	.4924	14		.197	.394	.602	.885	.059	.866	1.142	1.614	.....
1113a	.6516	Slow growth.		.354	.732	1.220	.....	.....	.....	.....	.....	.....
476	1.1428	...do		.240	.472	.709	.984	.047	1.012	1.299	.....	.....
1133	1.1581	.....		.224	.421	.626	.885	.039	.866	1.067	1.339	1.622
735a	.5240	5		.295	.551	.850	1.220	.118	1.272	1.693	.....	.....
735b	.5853	5		.287	.559	.886	1.240	.098	1.299	1.713	2.776	.....
1086a	.5897	3		.224	.433	.689	1.004	.091	1.063	1.417	2.284	.....
1086b	.5544	3		.291	.610	.937	1.398	.....	.....	.....	.....	.....
1140a	.9832	Slow growth.		.236	.472	.709	.945	.051	.965	1.229	1.535	.....
1140b	.9545	...do		.236	.417	.610	.835	.039	.854	1.102	.....	.....
487a	.4559	...do		.213	.433	.709	1.042	.157	1.102	.....	.....	.....
487b	.4104	...do		.181	.394	.610	.854	.079	.925	.....	.....	.....
462a	.3059	.....		.461	.....	.....	.....	.....	.....	.....	.....	.....
462b	.3096	.....		.....	.....	.....	.....	.....	.....	.....	.....	.....
475a	1.1139	Slow growth.		.185	.354	.524	.709	.012	.717	.894	1.102	1.397
475b	1.1273	...do		.197	.354	.535	.709	.012	.717	.906	1.091	1.389
452a	.3864	23		.197	.394	.575	.803	.039	.866	1.063	1.260	1.535

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	661	10.080	Short break. Fibers crushed.
.....	.....	.....	.....	.....	.....	671	10.230	Do.
.....	.....	.....	.....	.....	.....	400	6.100	Oblique. Cross-grained and curly.
.....	.....	.....	.....	.....	.....	590	9.000	Oblique. Cross-grained. ⅛ sap.
1.929	.....	.....	.....	.....	.....	890	13.570	Oblique. Cross-grained. ⅛ sap.
.....	.....	.....	.....	.....	.....	590	9.000	Short, brittle. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	666	10.150	Short, brittle. Opened cracks along grain. Fibers crushed.
.....	.....	.....	.....	.....	.....	712	10.860	Short, brittle. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	441	6.720	Brittle, oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	771	11.760	Broke into three pieces; long, triangular piece splitting off compression side. Cross-grained.
.....	.....	.....	.....	.....	.....	645	9.830	Oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	551	8.400	Short, brittle. Slight crushing of fibers.
.....	.....	.....	.....	.....	.....	510	7.780	Split along grain from end to middle.
.....	.....	.....	.....	.....	.....	173	2.640	Square, brittle. Badly worm-eaten.
.....	.....	.....	.....	.....	.....	105	1.600	Square, brittle, break.
1.508	1.823	2.087	.....	.....	.....	1,170	17.800	Long, splintering.
1.496	1.732	2.008	2.402	.....	.....	1,285	19.600	Opened crack along grain half length of stick.
.....	.....	.....	.....	.....	.....	842	12.840	Square, brittle, break. Opened oblique cracks along grain.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings, per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
452b	.8221	32		.173	.335	.520	.724	.035	.732	.949	1.181	1.398
280a	.6969	5		.295	.618	.984	1.575	.197	1.654	2.284	3.327	.....
280b	.7018	6		.272	.579	.945	1.484	.209	1.535	2.248	.....	.....
484a	.5307	.....		.315	.630	1.024	1.543	.217	1.614	.....	.....	.....
484b	.5333	.....		.276	.571	.925	1.350	.197	1.429	.....	.....	.....
341	.6916	10		.413	.787	.....	.....	.....	.....	.....	.....	.....
338a	.6062	7		.276	.512	.787	1.134	.091	1.181	.....	.....	.....
338b	.6762	7		.236	.472	.780	1.098	.098	1.134	.....	.....	.....
454a	1.2012	Slow growth.		.197	.366	.532	.709	.020	.748	.906	1.181	.....
460a	1.3545	30		.161	.346	.453	.610	.020	.630	.787	.965	1.181
460b	1.3430	Slow growth.		.161	.327	.476	.630	.020	.669	.835	.....	.....
803a	.5969	.....		.236	.484	.709	1.043	.094	1.083	.....	.....	.....
1094	.5066	10		.268	.559	.870	1.299	.098	1.339	.....	.....	.....
993a	.5942	13		.248	.417	.650	.866	.039	.906	1.102	1.441	.....
1139	.8721	20		.209	.394	.591	.772	.020	.768	.965	1.142	1.358
297a	.4653	Slow growth.		.256	.543	.882	.....	.....	.....	.....	.....	.....
297b	.4602	...do		.284	.591	.945	1.634	.....	.....	.....	.....	.....
427	.4970	.....		.315	.669	1.067	1.732	.295	1.913	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds of—					Maximum deflection.	Ultimate strength.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.630	1.988	.....	.....	.....	.....	1,045	15.980	Square, brittle break. Opened oblique cracks along grain.
.....	.....	.....	.....	.....	.....	661	10.080	Short, brittle. Opened oblique cracks along grain.
.....	.....	.....	.....	.....	.....	630	9.610	Short break.
.....	.....	.....	.....	.....	.....	551	8.400	Brittle. Opened oblique cracks along grain.
.....	.....	.....	.....	.....	.....	525	8.000	Short, brittle. Opened oblique cracks along grain, detaching long triangular piece compression side.
.....	.....	.....	.....	.....	.....	295	4.500	Broke at knots. Season crack at end ".35 wide, 1".25 deep. Cross-grained.
.....	.....	.....	.....	.....	.....	540	8.230	Broke at knots, 5" from middle.
.....	.....	.....	.....	.....	.....	450	6.860	Oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	771	11.760	Do.
1.127	1.575	.....	.....	.....	.....	1,060	16.160	Long, oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	640	9.760	Do.
.....	.....	.....	.....	.....	.....	488	7.440	Broke at knot, splitting along grain. Sap.
.....	.....	.....	.....	.....	.....	584	8.900	Broke at knots into three pieces. Cross-grained. Half sap.
.....	.....	.....	.....	.....	.....	705	10.750	Brittle. Opened cracks along grain.
1.866	1.890	2.244	.....	.....	.....	1,145	17.460	Square, brittle, ".5 deep. Oblique cracks along grain, split stick into five pieces.
.....	.....	.....	.....	.....	.....	440	6.710	Oblique. Fibers crushed. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	441	6.720	Do.
.....	.....	.....	.....	.....	.....	516	7.870	Broke at knot. Opening cracks along grain.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
684*a*	.5034	8		.276	.575	.906	1.240	.071	1.260	1.732	.....	.....
684*b*	.5227	11		.283	.551	.854	1.193	.091	1.252	1.740	.....	.....
307*a*	.7681	11		.217	.433	.654	.925	.059	.965	1.260	1.654	2.323
307*b*	.7784	10		.224	.406	.610	.882	.059	.921	1.209	1.654	2.284
928*a*	.5242	16		.228	.472	.748	1.142	.118	1.169	1.457	2.087	.....
928*b*	.5311	13		.284	.551	.866	1.260	.165	1.346	1.772	.....	.....
463*a*	1.0405	Slow growth.		.169	.319	.472	.650	.028	.669	.846	1.063	1.397
463*b*	1.0121	...do		.205	.378	.571	.748	.039	.748	.945	1.201	1.437
982*a*	.5455	.....		.276	.524	.827	1.201	.134	1.260	1.693	.....	.....
982*b*	.5341	.....		.256	.512	.780	1.161	.118	1.220	1.654	.....	.....
1023*a*	.4906	Slow growth.		.276	.457	.701	.984	.079	1.024	1.378	.....	.....
1023*b*	.5052	...do		.264	.454	.764	1.142	.098	1.181	1.614	.....	.....
1013*a*	.6927	17		.307	.539	.846	1.201	.079	1.236	1.587	2.032	.....
1014*a*	.7001	16		.303	.532	.827	1.161	.079	1.181	1.535	1.988	.....
376	.6852	10		.217	.394	.591	.787	.028	.799	1.024	1.378	.....
409*a*	.6776	25		.252	.413	.610	.807	.031	.839	1.063	.....	.....
299*a*	.8381	16		.126	.264	.402	.532	.012	.543	.669	.846	1.016
1233*a*	7.447	16		.114	.197	.303	.402	0	.402	.496	.598	.717

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
						585	8.920	Long, oblique.
						610	9.300	Do.
						845	12.880	Do.
3.543						894	13.630	Long, splintering.
						771	11.760	Brittle, splintering. End bearings in dented opposite corners.
						661	10.080	Long, oblique.
1.655	1.909	2.241				1,185	18.070	Brittle, splintering at knots.
1.732	2.205					1,052	16.040	Oblique, cross-grained.
						655	9.990	Square break. Split grain along neutral axis.
						655	9.990	Do.
						650	9.910	Square brittle. Split along grain.
						618	9.420	Do.
						670	10.220	Broke at knot. Oblique fractures along grain. Season cracks.
						771	11.760	Failed at knots, tension side. Season cracks.
						768	11.710	Oblique fracture, starting from corner, tension side. End bearings indented opposite corners.
						635	9.680	Oblique fracture. Cross-grained. End bearings indented opposite corners.
	1.269	1.535	1.968			1,213	18.500	Fine, splintering.
	854	1.069	1.296	1.508		1,320	20.130	Long, splintering, fibers crushed intersecting Cooper lines.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1233b	.6986	20		.102	.213	.331	.441	0	.441	.551	.669	.795
1234a	.7063	.....		.157	.276	.402	.535	.008	.535	.654	.795	.969
1234b	.7108	.....		.138	.260	.394	.512	.008	.512	.630	.768	.921
1235a	.7137	18		.118	.244	.378	.512	0	.512	.622	.776	.972
1235b	.7189	16		.134	.244	.358	.480	0	.492	.606	.748	.890
218	.7241	.....		.185	.335	.532	.717	.020	.709	.925	1.205	1.496
274	.7354	17		.177	.315	.472	.610	.020	.642	.787	1.024	1.260
440	.6972	20		.217	.335	.512	.698	.024	.709	.886	1.161	1.457
757a	.6979	10		.224	.413	.650	.906	.059	.945	1.209	1.634	2.087
757b	.6824	9		.315	.559	.827	1.181	.079	1.209	1.591	2.126	.....
1052a	.6642	20		.197	.346	.551	.748	.051	.756	.984	1.260	1.614
743a	.5524	10		.217	.413	.650	.925	.079	.965	1.260	.....	.....
743b	.5509	15		.197	.354	.571	.787	.028	.807	1.063	1.535	.....
530a	.6136	10		.220	.370	.559	.768	.047	.787	1.102	1.555	2.284
530b	.5999	8		.197	.374	.571	.748	.020	.756	.984	1.398	.....
20	.7143	6		.232	.445	.677	.965	.063	1.024	1.378	1.831	.....
878a	.6818	11		.217	.433	.669	.945	.047	.964	1.299	1.654	2.402
878b	.7102	9		.248	.461	.720	1.102	.118	1.118	1.476	2.007	2.543

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.996	1.181	1.535	1.969	.....	.....	1,213	18.500	Fine, splintering, ".5 deep; fibers crushed.
1.181	1.417	1.850	.....	.....	.....	1,162	17.720	Short, brittle. ".4 deep, splitting along neutral axis.
1.091	1.299	1.654	.....	.....	.....	1,208	18.420	Short, brittle. ".5 deep, slight crushing.
1.181	1.449	1.969	.....	.....	.....	1,168	17.810	Short, brittle. ".5 deep, split along grain.
1.067	1.358	.....	.....	.....	.....	1,088	15.880	Coarse, splintering at knots.
1.949	2.559	.....	.....	.....	.....	992	15.130	Long, splintering.
1.713	.....	.....	.....	.....	.....	992	15.130	Fine, splintering.
2.047	.....	.....	.....	.....	.....	964	14.700	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	878	13.390	Fine, splintering.
.....	.....	.....	.....	.....	.....	700	10.675	Oblique fracture, starting at corner, tension side. Knot in stick.
2.165	.....	.....	.....	.....	.....	960	14.640	Fine, splintering.
.....	.....	.....	.....	.....	.....	565	8.610	Oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	750	11.440	Square break, split along grain. Fibers crushed.
.....	.....	.....	.....	.....	.....	772	11.760	Short, brittle. Fibers crushed.
.....	.....	.....	.....	.....	.....	760	11.590	Do.
.....	.....	.....	.....	.....	.....	695	10.600	Long, oblique, beginning at knot 6" from middle.
.....	.....	.....	.....	.....	.....	882	13.450	Short, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	790	12.050	Long, splintering. Slight crushing. (Photograph.)

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1048*a*	.6699	11		.217	.425	.630	.866	.043	.906	1.240	1.654	.....
1048*b*	.6710	10		.228	.421	.610	.846	.039	.858	1.102	1.457	1.969
311*a*	.4773	6		.425	.811	1.220	1.752	.213	1.850	.....	.....	.....
311*b*	.4614	6		.374	.717	1.181	1.654	.138	1.732	2.795	.....	.....
290*a*	.4750	14		.315	.622	1.035	.....	.....	.....	.....	.....	.....
290*b*	.4585	11		.307	.551	.866	1.319	.150	1.378	.....	.....	.....
645*a*	.5227	7		.205	.390	.559	.835	.039	.835	1.102	1.476	.....
645*b*	.5227	7		.209	.425	.622	.827	.020	.866	1.102	1.437	.....
736*a*	.4888	6		.303	.602	.918	1.272	.102	1.319	1.713	.....	.....
736*b*	.5053	6		.252	.461	.709	1.063	.122	1.102	1.469	.....	.....
467*a*	.7967	11		.209	.374	.567	.839	.063	.906	1.201	.....	.....
467*b*	.8105	13		.209	.366	.571	.839	.059	.906	1.201	.....	.....
405*a*	.8205	8		.224	.295	.472	.610	.012	.622	.748	.925	1.130
405*b*	.8148	6		.157	.303	.453	.614	.008	.602	.748	.941	1.102
1247*a*	.7956	9		.126	.236	.354	.472	0	.472	.591	.709	.827
1247*b*	.7769	9		.118	.236	.354	.457	.079	.465	.571	.701	.835
1248*a*	.8069	9		.197	.343	.492	.654	.016	.661	.819	1.004	1.220
1248*b*	.8456	8		.146	.268	.394	.520	.020	.532	.646	.791	.957

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
.....	.....	.....	.....	.....	.....	771	11.760	Long, oblique, beginning at knot 6″ from middle. Fibers crushed.
.....	.....	.....	.....	.....	.....	882	13.450	Long, oblique, splintering. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	480	7.320	Short, brittle, long triangular piece, splitting out on compression side. Cross-grained.
.....	.....	.....	.....	.....	.....	555	8.460	Brittle fracture, piece splitting off. Cross-grained.
.....	.....	.....	.....	.....	.....	418	6.370	Short, brittle at knot middle of stick.
.....	.....	.....	.....	.....	.....	536	8.170	Short, brittle. Fibers crushed.
.....	.....	.....	.....	.....	.....	738	11.250	Short, brittle, opening cracks along grain. Fibres crushed.
.....	.....	.....	.....	.....	.....	760	11 590	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	652	9.940	Short, brittle. Split along grain from middle to end. Fibers crushed.
.....	.....	.....	.....	.....	.....	595	9.070	Short, brittle. Split obliquely along grain. Fibers crushed.
.....	.....	.....	.....	.....	.....	580	8.840	Short, brittle. Broke in two at middle.
.....	.....	.....	.....	.....	.....	652	9.940	Do.
1.778	1.975	1.850	2.165	.....	.....	1,280	19.520	Long, splintering.
1.280	1.457	1.752	2.039	2.532	.....	1,425	21.730	Do.
.980	1.154	1.366	1.573	.....	.....	1,305	19.900	Splintered at corners. Fibers crushed.
1.009	1.228	1.496	1.831	.....	.....	1,274	19.430	Fine, splintering. Fibers crushed.
1.497	1.796	.....	.....	.....	.....	1,005	15.330	Coarse, splintering.
1.169	1.319	1.585	1.827	.....	.....	1,315	20.050	Coarse, splintering at corners.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
815*a*	.6432	13		.185	.366	.543	.752	.012	.748	.933	1.181	1.496
815*b*	.6432	12		.236	.394	.571	.748	.020	.768	.945	1.181	1.654
1031*a*	.8019	8		.181	.335	.488	.638	.016	.658	.811	.984	1.220
650*a*	.9841	Slow growth.		.197	.370	.559	.768	.020	.787	1.043	1.327	1.654
650*b*	1.1966	...do...		.291	.551	.827	1.177	.055	1.220	.....	.....	.....
564*a*	1.0398	80		.260	.472	.768	1.024	.071	1.067	1.319	1.693	2.008
564*b*	.9466	80		.228	.433	.681	.945	.055	.965	1.201	.....	.....
33	.7852	13		.217	.394	.622	.850	.043	.886	1.142	1.457	1.850
33$_1$*a*	.6144	9		.201	.374	.571	.795	.039	.807	1.102	.....	.....
329*a*	.8697	About 30		.228	.449	.669	.906	.059	.984	1.299	1.654	.....
932*a*	.9594	16		.173	.350	.512	.717	.047	.736	.945	1.220	.....
519*a*	.7143	10		.220	.453	.728	1.098	.118	1.142	1.469	2.047	.....
1241*a*	.6966	13		.181	.346	.512	.724	.035	.740	1.024	1.476	.....
1242*a*	.6875	15		.157	.335	.551	.756	.059	.787	1.130	1.831	.....
1243*a*	.6670	18		.197	.354	.539	.787	.055	.807	1.114	1.732	.....
53$_2$*a*	.6250	10		.197	.335	.496	.661	.024	.709	.945	1.220	1.614
53$_2$*b*	.6381	9		.165	.315	.508	.693	.039	.736	.984	1.299	1.850
444*a*	.6968	9		.217	.433	.646	.886	.039	.925	1.248	1.555	2.185

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.878	.....	.....	.....	.....	.....	980	14.940	Long, splintering.
.....	.....	.....	.....	.....	.....	800	12.200	Failed at knot.
.....	.....	.....	.....	.....	.....	855	13.040	Oblique. Knots in stick.
2.138	.....	.....	.....	.....	.....	885	13.490	Short, oblique, 9″ from middle. Cross grained.
.....	.....	.....	.....	.....	.....	525	8.000	Short, irregular break at middle. Cross-grained at middle. Wood season-cracked.
.....	.....	.....	.....	.....	.....	780	11.890	Fractured at knot, splitting obliquely along grain.
.....	.....	.....	.....	.....	.....	635	9.680	Long, splintering.
2.677	.....	.....	.....	.....	.....	980	14.180	Fracture began at corner tension, side splitting along grain. One end bearing received on corner.
.....	.....	.....	.....	.....	.....	765	11.660	Failed at knot 6″ from middle. Oblique fracture extending across stick 10″.
.....	.....	.....	.....	.....	.....	771	11.760	Oblique fractures along grain. One end bearing received load on corner. One-quarter sap.
.....	.....	.....	.....	.....	.....	750	11.440	Oblique fractures beginning at corner. One-half sap.
.....	.....	.....	.....	.....	.....	661	10.080	Brittle fracture, opening oblique fractures along grain.
.....	.....	.....	.....	.....	.....	765	11.670	Coarse, splintering.
.....	.....	.....	.....	.....	.....	723	11.030	Coarse, splintering, .″3 deep, intersecting "Cooper" lines developed.
.....	.....	.....	.....	.....	.....	755	11.510	Fine, splintering, .″4 deep. Slight crushing.
2.344	.....	.....	.....	.....	.....	910	13.880	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	855	13.040	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	840	12.810	Fractured along grain, beginning at knot where worm-eaten.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
760a	.7628	12		.181	.335	.524	.692	.024	.709	.925	1.142	.....
760b	.7747	9		.157	.323	.504	.728	.039	.768	1.004	1.299	1.595
678a	.6705	8		.374	.748	1.118	1.701	.252	1.811	.....	.....	.....
678b	.6727	6		.339	.638	1.000	1.386	.118	1.484	.....	.....	.....
436a	.7323	7		.236	.425	.622	.902	.063	.894	1.169	1.496	1.969
1089a	.6341	10		.327	.630	.965	1.378	.098	1.457	1.890	2.963	.....
1090a	.6534	8		.425	.748	1.169	1.693	.236	1.791	2.402	.....	.....
1091a	.6250	10		.295	.532	.787	1.118	.059	1.181	.....	.....	.....
927a	.7750	.....		.378	.768	1.240	.....	.....	.....	.....	.....	.....
680a	.7818	.....		.354	.622	.906	.....	.....	.....	.....	.....	.....
680b	.7614	.....		.323	.610	.886	1.209	.063	1.248	.....	.....	.....
658a	.8068	3		.236	.461	.697	.957	.051	.984	1.260	1.614	.....
658b	.8568	.....		.244	.472	.681	.965	.087	1.004	1.319	1.654	2.067
697a	.8714	12		.185	.354	.551	.713	.024	.732	.945	1.142	.....
509	.5671	.....		.394	.835	1.287	2.020	.315	2.177	.....	.....	.....
480a	.7753	.....		.201	.346	.512	.701	.035	.709	.906	1.240	.....
68a	.6004	.....		.236	.500	.760	1.079	.067	1.102	1.457	.....	.....
68b	.5915	.....		.295	.524	.827	1.138	.063	1.142	1.437	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.654	.....	.....	.....	.....	.....	1,010	15.400	Long, splintering.
2.067	.....	.....	.....	.....	.....	925	14.100	Long, oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	480	7.320	Oblique, fracture at knot. Sap.
.....	.....	.....	.....	.....	.....	545	8.310	Oblique, fracture at knot.
2.677	.....	.....	.....	.....	.....	945	14.410	Long, oblique. Fibers separated and buckled. Season-crack on one end.
.....	.....	.....	.....	.....	.....	690	10.520	Long, oblique.
.....	.....	.....	.....	.....	.....	610	9.300	Long, oblique. Knot at middle of stick.
.....	.....	.....	.....	.....	.....	485	7.390	Short, oblique 6″ from end bearing at knot.
.....	.....	.....	.....	.....	.....	388	5.920	Long oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique 5″ long 12″ from end. Cross-grained.
.....	.....	.....	.....	.....	.....	540	8.230	Oblique fracture 6″ long, 5″ from middle of stick.
.....	.....	.....	.....	.....	.....	850	12.960	Broke at knot.
.....	.....	.....	.....	.....	.....	835	12.730	Oblique fracture 9″ long at knots middle of stick.
.....	.....	.....	.....	.....	.....	745	11.360	Opened long, oblique fracture, beginning 4″ from end of stick. Cross-grained.
.....	.....	.....	.....	.....	.....	520	7.930	Brittle, oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	905	13.800	Long, splintering.
.....	.....	.....	.....	.....	.....	610	9.300	Fracture began at knot, tension side, following grain in oblique direction.
.....	.....	.....	.....	.....	.....	661	10.080	Long, oblique.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
334a	.8045	.....		.209	.394	.587	.815	.020	.811	1.063	1.339	1.614
435a	.6538	.....		.308	.636	1.024	1.516	.177	.....	.....	.....	.....
968a	.4699	6		.256	.458	.697	.992	.059	1.024	1.417	.....	.....
968b	.4750	6		.256	.441	.669	.972	.067	1.024	1.437	.....	.....
15a	.7438	9		.248	.456	.681	.929	.039	.953	1.181	1.516	1.881
15b	.7387	9		.189	.433	.626	.866	.024	.866	1.102	1.406	1.732
1058a	.6751	8		.260	.500	.768	1.063	.059	1.102	1.417	1.811	2.067
1058b	.6716	8		.276	.496	.768	1.043	.059	1.063	1.339	1.811	2.343
368a	.5648	15		.252	.449	.658	.890	.039	.906	1.181	1.595	.....
406a	.5029	17		.295	.585	.846	1.209	.067	1.244	1.713	.....	.....
115a	.5315	About 22		.295	.571	.854	1.260	.063	1.280	.....	.....	.....
115a	.5048	18		.236	.453	.693	.969	.039	.984	1.280	1.772	.....
317a	.5315	20		.248	.480	.748	1.055	.043	1.083	1.417	.....	.....
317b	.5493	.....		.228	.465	.658	.906	.024	.945	1.181	.....	.....
127a	.6790	.....		.197	.394	.598	.846	.051	.866	1.122	1.437	1.850
127b	.6671	.....		.157	.374	.591	.827	.047	.866	1.102	1.772	2.264
148	.6471	6		.197	.413	.630	.846	.039	.886	1.102	1.437	1.791
753a	.6105	4		.197	.402	.598	.827	.024	.858	1.043	1.339	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.909	2.423	3.307	.....	.....	.....	1,105	17.760	Fine, splintering.
.....	.....	.....	.....	.....	.....	441	6.720	Brittle, fracture at knots. Stick season-cracked.
.....	.....	.....	.....	.....	.....	645	9.880	Brittle, fracture splitting along grain. Fibers crushed.
.....	.....	.....	.....	.....	.....	630	9.610	Brittle, splintering. Fibers crushed at middle bearing and 2½″ either side.
2.269	2.872	.....	.....	.....	.....	1,102	16.800	Brittle. Cracked along grain, partly detaching long triangular fragments. Half sap.
2.165	.....	.....	.....	.....	.....	1,030	15.710	Splintering, fracture and sap wood, tension side.
.....	.....	.....	.....	.....	.....	772	11.770	Oblique, fracture 10″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	772	11.770	Oblique, fracture 16″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	722	11.010	Brittle, splintering.
.....	.....	.....	.....	.....	.....	605	9.220	Brittle, fracture running across stick obliquely in 10″. Fibers crushed.
.....	.....	.....	.....	.....	.....	545	8.310	Long, oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	680	10.370	Brittle. Cracked along grain, detaching piece on tension side.
.....	.....	.....	.....	.....	.....	648	9.880	Oblique, splintering. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	650	9.910	Oblique, starting at corner tension side.
.....	.....	.....	.....	.....	.....	850	12.960	Splintering. Fibers crushed at small knot and neutral axis at middle.
.....	.....	.....	.....	.....	.....	938	14.300	Splintering and brittle.
.....	.....	.....	.....	.....	.....	582	13.450	Fine, splintering.
.....	.....	.....	.....	.....	.....	750	11.440	Long, splintering.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
768*b*	.6244	4		.217	.394	.610	.819	.039	.846	1.063	1.378	.....
687*a*	.7637	12		.236	.500	.768	1.118	.063	1.114	1.437	.....	.....
1032	.8786	5		.276	.535	.866	1.272	.157	1.339	2.374	.....	.....
1062*a*	.8698	.....		.161	.350	.532	.724	.008	.748	.925	1.150	1.406
1062*b*	.8481	.....		.197	.386	.551	.728	.024	.748	.965	1.260	1.476
1158*a*	.9677	25		.276	.539	.878	1.280	.177	1.378	1.890	2.638	.....
1158*b*	.9734	25		.256	.512	.787	1.142	.118	1.181	1.496	2.205	3.543
1087*a*	.7357	7		.256	.512	.846	.....	.....	.....	.....	.....	.....
1087*b*	.7227	7		.264	.532	.839	.....	.....	.....	.....	.....	.....
1088*a*	.7340	10		.378	.827	1.319	.....	.....	.....	.....	.....	.....
1088*b*	.7382	8		.295	.610	.969	1.437	.189	1.457	2.028	.....	.....
410*a*	.5726	6		.335	.614	1.004	.....	.....	.....	.....	.....	.....
607*a*	.6818	8		.236	.472	.720	1.043	.059	1.067	1.378	1.850	.....
607*b*	.7125	13		.244	.504	.807	.....	.....	.....	.....	.....	.....
328*a*	.6944	8		.354	.669	1.102	1.535	.193	1.614	2.284	.....	.....
328*b*	.7166	8		.378	.748	1.122	1.665	.197	1.732	.....	.....	.....
1093*a*	.7767	14		.256	.496	.787	1.142	.083	1.142	1.496	.....	.....
1093*b*	.7946	16		.256	.484	.713	1.024	.079	1.043	1.346	1.831	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	745	11.360	Brittle, fracture at knot middle of stick.
.....	.....	.....	.....	.....	.....	650	9.910	Oblique, fracture commencing at knot 7½″ from middle. Season-cracked.
.....	.....	.....	.....	.....	.....	551	8.400	Cross-grained, break started 2″ from middle, splitting along grain.
2.642	2.087	2.913	.....	.....	.....	1,190	18.150	Oblique, fracture 15″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	875	13.340	Oblique, fracture beginning at corner. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	700	10.675	Long, oblique. End bearings unevenly indented.
.....	.....	.....	.....	.....	.....	772	11.770	Tough, splintering.
.....	.....	.....	.....	.....	.....	415	6.330	Broke at knot 3″ from middle. Stick contains 20 knots.
.....	.....	.....	.....	.....	.....	398	6.070	Broke at knot 2½″ from middle.
.....	.....	.....	.....	.....	.....	425	6.480	Oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	585	8.920	Do.
.....	.....	.....	.....	.....	.....	420	6.400	Broke at knot 3″ from middle.
.....	.....	.....	.....	.....	.....	750	11.440	Long, splintering.
.....	.....	.....	.....	.....	.....	418	6.370	Failed at knots.
.....	.....	.....	.....	.....	.....	582	8.870	Split on tension side, beginning at knot. Cross-grained.
.....	.....	.....	.....	.....	.....	551	8.400	Brittle, fracture at knots.
.....	.....	.....	.....	.....	.....	661	10.080	Brittle, fracture in vicinity of knots.
.....	.....	.....	.....	.....	.....	665	10.140	Do.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
949a	.7965	25		.209	.421	.630	.906	.039	.906	1.142	1.457	1.949
1061b	.8670	7		.228	.433	.654	1.004	.083	1.024	1.339	.....	.....
425a	.7165	16		.260	.530	.795	1.142	.087	1.201	1.543	.....	.....
426b	.7396	6		.195	.532	.827	1.193	.118	1.260	1.614	2.329	.....
926a	.7102	9		.268	.571	.886	1.299	.098	1.339	.....	.....	.....
239a	.7239	18		.323	.650	1.102	1.535	.197	1.642	2.244	3.268	.....
767a	.7973	20		.266	.543	.925	1.329	.169	1.378	1.752	2.756	.....
241a	.8311	26		.161	.315	.453	.575	0	.551	.728	.878	1.168
849a	.8472	30		.177	.335	.496	.669	.031	.685	.886	1.142	1.417
849b	.8409	15		.165	.315	.488	.669	.028	.697	.906	1.181	1.457
546a	.5447	.....		.319	.630	.965	1.425	.134	1.492	.....	.....	.....
546b	.5795	.....		.234	.571	.925	1.358	.177	1.425	2.067	.....	.....
1095a	.6012	.....		.217	.413	.630	.886	.039	.913	1.189	1.772	.....
1095b	.5765	.....		.197	.386	.571	.811	.035	.827	1.122	.....	.....
1173a	.6080	9		.256	.500	.807	1.220	.138	1.260	1.772	2.110	.....
1173b	.6477	13		.276	.472	.776	1.142	.106	1.197	1.654	2.638	.....
1181a	.5864	16		.256	.492	.748	1.268	.142	1.378	.....	.....	.....
1181b	.6000	16		.244	.453	.698	1.130	.157	1.220	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds of—					Maximum deflection.	Ultimate strength.		Description of fracture.
802	902	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	810	12.360	Oblique, 9″ long. Broke between middle and end bearings. Cross-grained.
.....	.....	.....	.....	.....	.....	586	8.949	Fracture began at knot 5″ from middle.
.....	.....	.....	.....	.....	.....	656	10.000	Oblique, starting at knot.
.....	.....	.....	.....	.....	.....	675	10.268	Fibers parted tension side. Crushed compression side.
.....	.....	.....	.....	.....	.....	476	7.290	Oblique, 8″ long. Cross-grained and knots.
.....	.....	.....	.....	.....	.....	670	10.220	Brittle. Split along grain.
.....	.....	.....	.....	.....	.....	664	10.380	Brittle. Fractured at knots.
1.330	1.566	2.086	.....	.....	.....	1,182	18.060	Fine, splintering. Fibers crushed.
1.870	.....	.....	.....	.....	.....	1,022	15.580	Fine, splintering. Fibers crushed. (Photograph.)
2.244	.....	.....	.....	.....	.....	992	15.130	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	490	7.470	Opened crack along grain from end to middle, splitting stick in halves.
.....	.....	.....	.....	.....	.....	625	9.530	Short, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	730	11.130	Short, brittle. Split along grain. Fibers crushed.
.....	.....	.....	.....	.....	.....	661	10.080	Oblique fractures, 16″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	705	10.750	Long, splintering. Fibers crushed. Sap.
.....	.....	.....	.....	.....	.....	695	10.600	Long, splintering. Fibers crushed. Sap.
.....	.....	.....	.....	.....	.....	520	7.930	Long, oblique. Fibers crushed. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	512	7.810	Long, splintering. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
1182*a*	.6250	16		.197	.378	.575	.803	.039	.835	1.150	.....	.....
1182*b*	.6375	16		.165	.362	.579	.866	.047	.906	1.417	.....	.....
1183*a*	.5409	16		.236	.433	.693	.984	.055	1.008	1.378	.....	.....
1183*b*	.6159	16		.189	.394	.610	.933	.094	1.024	1.575	.....	.....
485*a*	1.1477	16		.118	.236	.331	.433	.532	.669	.787	.945	1.102
485*b*	1.1335	16		.118	.228	.335	.453	.008	.453	.571	.709	.850
489*a*	1.0240	.....		.236	.421	.630	.850	.035	.886	1.114	1.398	1.670
489*b*	1.0292	.....		.181	.339	.500	.689	.024	.689	.866	1.122	1.378
507*a*	.7384	Slow growth.		.276	.606	.....	.....	.....	.....	.....	.....	.....
507*b*	.7238	...do		.248	.472	.768	1.012	.047	1.043	1.417	2.008	.....
1118*a*	1.0632	...do		.118	.244	.374	.492	.012	.512	.650	.827	1.024
1135	.9405	...do		.189	.354	.532	.728	.028	.728	.925	1.193	1.457
1127*a*	.9966	...do		.161	.319	.492	.669	.035	.705	.906	1.122	1.417
1127*b*	1.0023	...do		.165	.327	.492	.661	.024	.689	.882	1.142	1.378
67*a*	.8937	...do		.244	.472	.717	1.059	.087	1.417	1.969	2.756	.....
67*b*	.8903	...do		.244	.453	.669	.965	.079	1.004	1.287	1.697	2.291
1077*a*	.8647	18		.232	.453	.658	.929	.059	.965	1.260	1.693	2.382
1077*b*	.8489	18		.217	.402	.642	.945	.063	.969	1.260	1.673	2.344

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	630	9.610	Fractured at corner, splitting along grain. Fibers crushed. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	578	8.810	Splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	622	9.480	Short, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	580	8.840	Short, splintering. Fibers crushed.
1.268	1.508	.....	.....	.....	.....	1,252	19.090	Coarse, splintering. Stick polished in dressing.
1.012	1.165	.....	.....	.....	.....	1,040	15.860	Brittle, splintering. Stick polished in dressing.
.....	.....	.....	.....	.....	.....	781	11.910	Coarse, splintering. Split along grain.
1.772	.....	.....	.....	.....	.....	992	15.130	Oblique fracture, 10″ long.
.....	.....	.....	.....	.....	.....	257	3.920	Failed at knot 5″ from middle.
.....	.....	.....	.....	.....	.....	718	10.950	Long, splintering. Fibers crushed. Worm eaten at one end.
1.260	1.713	.....	.....	.....	.....	992	15.130	Fine, splintering at one corner. Fibers crushed. Opened at season cracks. Cross-grained.
1.831	2.421	.....	.....	.....	.....	1,102	16.800	Coarse, splintering.
1.831	2.441	.....	.....	.....	.....	1,108	16.900	Fine, splintering.
1.811	2.421	.....	.....	.....	.....	1,102	16.800	Short, brittle. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	821	12.520	Failed at knots.
3.327	.....	.....	.....	.....	.....	953	14.530	Coarse, splintering.
3.209	.....	.....	.....	.....	.....	955	14.560	Long, coarse splintering.
.....	.....	.....	.....	.....	.....	908	13.850	Long, coarse splintering. Knots near middle.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1092*a*	.8387	13		.315	.598	.965	1.390	.142	1.457	1.909	2.992	.....
761*a*	.7795	Slow growth.		.244	.484	.787	1.142	.138	1.228	1.595	2.205	.....
812*a*	.7978	...do....		.244	.453	.717	1.052	.087	1.122	1.437	2.047	2.677
812*b*	.7946	...do....		.252	.472	.736	1.063	.098	1.126	1.535	2.165	3.425
960*a*	.7762	19		.236	.394	.571	.799	.035	.799	1.004	1.260	1.673
960*b*	.7807	19		.197	.354	.520	.689	.016	.709	.906	1.142	1.389
605*a*	.5739	12		.315	.602	.984	1.469	.130	1.496	2.047	.....	.....
605*b*	.6171	6		.276	.532	.799	1.161	.087	1.201	1.614	.....	.....
813*a*	.6221	Slow growth.		.205	.433	.638	.886	.016	.906	1.142	1.496	.....
813*b*	.6445	...do.....		.217	.370	.582	.709	.016	.717	.866	1.083	1.378
750*a*	.7886	10		.240	.453	.697	1.012	.079	1.024	1.339	1.811	2.469
750*b*	.7936	10		.252	.492	.748	1.043	.079	1.083	1.457	1.909	2.913
833*a*	.7364	Slow growth.		.260	.500	.776	1.130	.091	1.169	1.496	2.087	3.307
833*b*	.7534	...do....		.295	.472	.748	1.142	.118	1.181	1.654	2.264	3.740
834	.7233	...do.....		.291	.539	.850	1.260	.138	1.319	1.772	2.598	4.567
834	.6800	...do.....		.236	.441	.669	.984	.087	.992	1.280	1.732	2.520
835	.7913	...do.....		.299	.591	1.024	1.516	.217	1.598	2.284	3.987	.....
517*a*	.5979	....		.236	.472	.768	1.130	.094	1.161	1.496	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
						668	10.190	Brittle. Opened cracks along grain.
						772	11.770	Brittle. Opened long oblique crack.
4.331						895	13.650	Short, splintering.
						835	12.730	Coarse, splintering.
						876	13.360	Long, splintering.
1.693						990	15.100	Long, splintering.
						652	9.940	Square, brittle. Cracked along grain. Fibers crushed.
						628	9.580	Oblique, brittle. Detached piece 12″ long, opening crack along neutral axis.
						735	11.210	Coarse, oblique, splintering. End-bearings indented opposite corners.
						855	13.040	Do.
3.661						938	14.300	Fine, splintering. Slight crushing.
4.724						896	13.660	Corners splintered tension side. Fibers crushed.
						858	13.080	Fine, splintering.
						832	12.690	Do.
						730	11.890	Do.
					4.606	869	13.250	Splintering fracture beginning at corner-tension side.
						675	10.290	Fine, short splintering. Fibers crushed at knot.
						645	9.830	Short, brittle. Split along neutral axis from middle to end.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
235a	.5066	Slow growth.		.284	.492	.772	1.083	.963	1.110	1.476	2.008	.....
235b	.5734	...do.....		.217	.453	.709	1.004	.059	1.085	1.366	2.146	.....
128a	.6648	.....		.354	.650	1.142	1.752	.283	1.811	2.362	.....	.....
128b	.6135	.....		.343	.681	1.130	1.693	.295	1.791	2.606	4.263	.....
550a	.5455	.....		.457	.815	1.299	1.909	.335	2.087	3.228	.....	.....
550b	.5227	.....		.323	.658	1.051	1.585	.197	1.606	2.349	.....	.....
604a	.5789	23		.421	.866	1.437	2.264	.453	2.461	4.253	.....	.....
604b	.5841	12		.394	.866	1.437	2.284	.480	2.382	.....	.....	.....
681a	.5216	.....		.551	1.260	2.165	.....	.....	.....	.....	.....	.....
110a	.8353	Slow growth.		.197	.402	.579	.811	138	.827	1.063	1.339	.....
110a	.9034	...do.....		.218	.374	.575	.776	035	.827	1.024	1.319	1.614
739a	.8269	...do.....		.272	.524	.815	1.142	.118	1.220	1.575	2.067	2.795
466a	.9554	...do.....		.169	.354	.453	.610	.016	.618	.787	.933	1.162
466b	.9523	...do.....		.157	.295	.449	.598	.020	.606	.748	.906	1.122
381a	.5424	22		.291	.563	.874	.....	.....	.....	.....	.....	.....
1033a	.7273	Variable.		.23	.472	.728	1.024	.079	1.063	1.378	.....	.....
643a	.7199	Uncertain		.260	.484	.768	1.063	.071	1.102	1.378	1.870	2.461
643b	.7000	...do.....		.315	.614	.945	1.307	.110	1.378	1.752	2.323	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*				
.....	.....	.....	.....	.....	.....	736	11.220	Cracked along neutral axis. Piece 24″ long detached on tension side. Cross-grained.
.....	.....	.....	.....	.....	.....	700	10.675	Detached 3 pieces tension side. End-bearings indented opposite corners. Cross-grained.
.....	.....	.....	.....	.....	.....	660	10.060	Coarse, splintering.
.....	.....	.....	.....	.....	.....	682	10.400	Coarse, splintering. Oblique crack detaching piece 20″ long.
.....	.....	.....	.....	.....	.....	590	8.990	Short, brittle. Oblique fracture 10″ long detaching one end of specimen.
.....	.....	.....	.....	.....	.....	645	9.830	Short, brittle. Oblique fracture 18″ long nearly detaching one end of specimen.
.....	.....	.....	.....	.....	.....	598	9.120	Long, oblique, starting from corner. Slight crushing.
.....	.....	.....	.....	.....	.....	520	7.930	Long, splintering at one corner.
.....	.....	.....	.....	.....	.....	350	5.340	Fracture began in knot at corner, opening oblique crack.
.....	.....	.....	.....	.....	.....	685	10.440	Failed at knots. Opened season cracks. Cross-grained.
2.008	2.697	3.622	.....	.....	.....	1,155	17.610	Long, fine splintering. Opened season cracks at each end.
.....	.....	.....	.....	.....	.....	846	12.900	Failed at knot 3″ from middle. Opened long oblique cracks.
1.319	.....	.....	.....	.....	.....	900	13.720	Oblique fracture 16″ long, separating stick.
1.299	1.496	.....	.....	.....	.....	992	15.130	Coarse, splintering. Grain wavy.
.....	.....	.....	.....	.....	.....	382	5.820	Short, brittle, 5″ from middle at defect in wood.
.....	.....	.....	.....	.....	.....	640	9.760	Oblique fracture at small knot.
.....	.....	.....	.....	.....	.....	840	12.810	Short, brittle, detached piece 8″ long. Cross-grained near ends.
.....	.....	.....	.....	.....	.....	778	11.860	Do.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
679a	.7455	Uncertain		.197	.362	.551	.748	.024	.787	1.004	1.280	1.664
679b	.7546	...do.....		.228	.441	.642	.886	.039	.925	1.181	1.504	2.008
683a	.7671	...do.....		.295	.563	.866	1.240	.098	1.291	1.693	.....	.....
683b	.7500	...do.....		.358	.701	1.142	1.713	.217	1.811	.....	.....	.....
353a	.7386	11		.244	.480	.748	1.240	.....	.....	.....	.....	.....
353b	.7500	11		.205	.394	.591	.827	.047	.846	1.102	1.417	1.850
262a	.7641	....		.295	.575	.882	1.228	.102	1.323	1.752	.....	.....
262a	.6900	....		.413	.768	1.220	1.732	.189	1.850	.....	.....	.....
263a	.6216	{ Slow growth.		.295	.571	.898	1.280	.091	1.319	1.732	.....	.....
263a	.6404	...do.....		.315	.622	.984	1.346	.110	1.398	1.811	.....	.....
492a	.9662	....		.169	.307	.472	.646	.035	.685	.858	1.110	1.378
492b	.9581	....		.209	.386	.610	.827	.063	.866	1.122	1.465	.....
461a	.9872	{ Slow growth		.197	.335	.504	.689	.024	.709	.945	1.181	1.614
461b	.9826	...do		.197	.366	.535	.720	.035	.748	.925	1.181	1.496
488a	.9602	...do		.142	.268	.394	.512	.012	.539	.669	.787	.964
488b	.9172	...do		.138	.276	.417	.551	.012	.571	.709	.866	1.063
500a	.8828	.....		.161	.327	.484	.654	.016	.669	.846	1.063	1.319
746a	.7913	9		.256	.512	.767	1.161	.110	1.240	1.638	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*				
2.087	.....	.....	.....	.....	.....	955	14.560	Short, brittle. Opened cracks on center of stick.
.....	.....	.....	.....	.....	.....	845	12.880	Short, brittle, detached piece 10″ long.
.....	.....	.....	.....	.....	.....	648	9.880	Detached piece 10″ long. Stick contained about 25 small knots.
.....	.....	.....	.....	.....	.....	515	7.850	Short, brittle. Cracks along center of specimen.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique fracture, taking place at knot 6″ from middle.
2.539	.....	.....	.....	.....	.....	931	14.200	Long, fine splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	655	9.990	Failed at knot 3″ from middle.
.....	.....	.....	.....	.....	.....	550	8.390	Brittle, oblique, 20″ long, separating stick into halves.
.....	.....	.....	.....	.....	.....	650	9.910	Long, oblique.
.....	.....	.....	.....	.....	.....	595	9.070	Long, oblique. Began at knot 8″ from middle.
1.811	.....	.....	.....	.....	.....	890	13.570	Oblique fracture 12″ long. Cross grained.
.....	.....	.....	.....	.....	.....	722	11.010	Oblique fracture 4″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	865	13.190	Long, splintering.
1.929	.....	.....	.....	.....	.....	965	14.710	Do.
1.181	1.457	1.772	.....	.....	.....	1,189	18.130	Do.
1.240	1.476	1.929	.....	.....	.....	1,102	16.800	Do.
1.575	.....	.....	.....	.....	.....	948	14.460	Splintering in vicinity of knots 5″ from middle.
.....	.....	.....	.....	.....	.....	632	9.640	Oblique. Cross-grained.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1083a	.7148	20		.394	.736	.....	.....	.....	.....	.....	.....	.....
930a	.5847	.....		.394	.776	1.240	1.811	.276	1.937	.....	.....	.....
930b	.5904	20		.402	.890	.....	.....	.....	.....	.....	.....	.....
333a	.8061	7		.276	.492	.768	1.122	.094	1.169	.....	.....	.....
1124a	.8628	.....		.291	.638	1.051	1.598	.295	1.713	.....	.....	.....
458a	1.0786	.....		.193	.374	.579	.776	.039	.787	.992	1.260	1.563
458b	1.0191	.....		.205	.394	.591	.795	.032	.827	1.043	1.307	1.672
61a	.7633	16		.236	.484	.709	1.032	.079	1.102	1.417	2.008	.....
61b	.7360	16		.256	.512	.764	1.142	.126	1.169	1.535	2.165	.....
1084a	.8125	13		.256	.472	.760	1.122	.098	1.181	1.496	2.047	2.874
1084b	.8239	10		.276	.524	.827	1.197	.118	1.252	1.595	2.284	3.071
1162	.8409	.....		.335	.638	1.024	1.496	.205	1.583	2.165	3.071	5.315
425a	.8715	13		.138	.287	.433	.591	.008	.591	.748	.953	1.181
811a	.8178	6		.315	.618	.976	1.390	.157	1.492	1.969	2.780	4.390
811b	.8119	8		.319	.638	1.012	1.496	.177	1.535	2.067	3.110	4.547
347	.5580	6		.315	.618	1.008	1.575	.217	1.654	2.480	.....	.....
738a	.6703	11		.299	.571	.906	1.260	.098	1.299	1.732	2.323	3.228
738b	.6577	.....		.291	.551	.886	1.260	.102	1.299	1.693	2.362	3.799

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	310	4.730	Failed at knot 3″ from middle.
.....	.....	.....	.....	.....	.....	535	8.160	Short, brittle, opened crack along neutral axis.
.....	.....	.....	.....	.....	.....	250	3.810	Failed at knot near middle. Oblique fracture.
.....	.....	.....	.....	.....	.....	530	8.080	Failed at knots.
.....	.....	.....	.....	.....	.....	485	7.390	Oblique fracture. Detached triangular piece 8″ long, compression side. Cross-grained.
1.917	.....	.....	.....	.....	.....	895	13.650	Oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	820	12.500	Brittle, piece 16″ long, nearly detached, compression side.
.....	.....	.....	.....	.....	.....	674	10.290	Short, brittle. Oblique fracture from tension to compression side 10″ long.
.....	.....	.....	.....	.....	.....	770	11.740	Short, brittle. Opened cracks along neutral axis.
.....	.....	.....	.....	.....	.....	878	13.390	Short, brittle. Opened cracks along center.
.....	.....	.....	.....	.....	.....	831	12.670	Short, brittle. Oblique crack detaching one end.
.....	.....	.....	.....	.....	.....	795	12.120	Short, brittle. Opened cracks along center.
1.386	1.693	2.205	2.953	.....	.....	1,213	18.500	Long, splintering, in oblique direction. Fibers crushed. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	841	12.820	Short, splintering.
.....	.....	.....	.....	.....	.....	832	12.690	Do.
.....	.....	.....	.....	.....	.....	582	8.870	Oblique fracture, 11″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	828	12.630	Long, oblique, splintering, opening cracks from middle to one end.
.....	.....	.....	.....	.....	.....	782	11.920	Brittle, splintering.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
660a	.6632	16		.374	.709	1.161	1.685	.205	1.752	2.520	.....	.....
660b	.6995	12		.276	.583	.958	1.437	.173	1.496	.....	.....	.....
39₂	.6591	9		.173	.315	.458	.626	.016	.650	.827	1.102	1.457
130a	.6913	5		.161	.299	.457	.630	.012	.630	.815	1.032	1.367
130b	.6864	5		.169	.315	.449	.622	.012	.630	.803	1.039	1.378
114a	.4983	25		.354	.724	1.161	1.866	.244	1.992	.....	.....	.....
114b	.5468	22		.276	.567	.913	1.398	.165	1.457	2.126	.....	.....
114₂c	.7534	11		.181	.331	.484	.669	.039	.689	.886	1 209	1.543
114₄a	.6621	14		.161	.299	.453	.591	.016	.598	.748	.945	1.201
114₈a	.5919	14		.236	.441	.701	1.035	.079	1.083	1.465	2.284	.....
212a	.6569	5		.197	.354	.551	.748	.197	.768	1.024	1.358	1.969
212b	.6523	4		.205	.382	.575	.787	.039	.799	1.047	1.378	1.969
267₂	.6250	20		.213	.394	.559	.768	.024	.815	1.063	1.417	.....
227a	.6346	11		.236	.413	.610	.866	.039	.866	1.154	1.535	.....
227₁a	.6613	12		.217	.402	.630	.898	.043	.925	1.220	1.634	2.362
227₂	.7242	13		.157	.295	.445	.602	.012	.602	.760	.976	1,189
431a	.6791	24		.161	.315	.480	.650	.020	.669	.835	1.083	1.378
551a	.6416	21		.197	.354	.512	.748	.039	.768	1.024	1.378	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	626	9.540	Brittle. Detached piece 22″ long, compression side.
.....	.....	.....	.....	.....	.....	545	8.310	Brittle.
.....	.....	.....	.....	.....	.....	868	13.240	Short, splintering.
1.791	.....	.....	.....	.....	.....	915	13 950	Coarse, splintering. Fibers crushed.
1.850	.....	.....	.....	.....	.....	895	13.650	Splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	551	8.400	Brittle, oblique.
.....	.....	.....	.....	.....	.....	582	8.870	Short, brittle, opened cracks along center.
2.224	.....	.....	.....	.....	.....	983	14.990	Splintering.
1.614	.....	.....	.....	.....	.....	915	13.950	Splintering. Fibers crushed, intersecting "Cooper" lines.
.....	.....	.....	.....	.....	.....	698	10.640	Long, splintering. Fibers crushed intersecting "Cooper" lines.
.....	.....	.....	.....	.....	.....	804	12.260	Short, brittle. Slight, crushing.
.....	.....	.....	.....	.....	.....	854	13.020	Do.
.....	.....	.....	.....	.....	.....	772	11.770	Short, brittle. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	765	11.660	Short, brittle.
.....	.....	.....	.....	.....	.....	810	12.350	Short, brittle. Opened cracks along center.
1.504	2.016	.....	.....	.....	.....	995	15.170	Splintering. Oblique crack 15″ long separating stick.
1.909	.....	.....	.....	.....	.....	910	13.880	Short, brittle. Opened cracks along grain. (Photograph.)
.....	.....	.....	.....	.....	.....	756	11.530	Splintering.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
551*b*	.6037	14		.177	.394	.571	.846	.051	.886	1.181	1.654	.....
747*a*	.6512	17		.291	.598	.996	.....	.....	.....	.....	.....	.....
747*b*	.6250	17		.350	.681	1.087	1.543	.165	1.614	2.213	.....	.....
1045*a*	.7955	10		.236	.402	.598	.846	.059	.866	1.110	1.437	1.850
1045*b*	.8205	15		.157	.323	.504	.669	.035	.689	.886	1.142	1.457
364*a*	.8193	11		.177	.374	.512	.693	.028	.720	.906	1.209	1.555
364*b*	.7762	11		.165	.339	.512	.709	.020	.724	.925	1.201	1.496
937*a*	.7292	19		.276	.543	.866	1.272	.142	1.307	1.752	.....	.....
139	.6416	22		.197	.343	.504	.693	.039	.697	.886	1.122	1.394
229$_1$	.7064	14		.264	.512	.846	1.268	.197	1.307	1.791	2.539	.....
229$_1$	.6811	12		.197	.394	.591	.827	.067	.850	1.075	1.394	1.850
1050*a*	.6080	8		.472	.965	1.740	2.992	.728	3.189	.....	.....	.....
57*a*	.7273	10		.315	.650	1.071	1.535	.228	1.614	2.205	3.701	.....
308*a*	.5977	6		.315	.630	.965	1.417	.138	1.480	.....	.....	.....
308*b*	.6523	7		.217	.413	.610	.827	.032	.839	1.083	1.496	2.008
957*a*	.7022	11		.248	.492	.748	1.028	.071	1.089	1.339	1.791	2.362
957*b*	.7683	9		.118	.244	.370	.500	.020	.508	.630	.827	1.043
957	.6893	9		.276	.528	.811	1.181	.098	1.189	1.638	2.244	3.307

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	718	10.940	Splintering at one corner.
.....	.....	.....	.....	.....	.....	390	5.950	Broke at knot near middle.
.....	.....	.....	.....	.....	.....	652	9.940	Irregular, brittle. Cross grained
2.539	.....	.....	.....	.....	.....	958	14.610	Oblique, splintering.
1.949	2.835	.....	.....	.....	.....	1,036	15.800	Fine splintering. Fibers crushed. (Photograph.)
2.110	3.130	.....	.....	.....	.....	1,049	16.000	Long, splintering.
1.811	2.500	.....	.....	.....	.....	1,067	16.270	Do.
.....	.....	.....	.....	.....	.....	575	8.770	Oblique fracture 6″ long. Cross-grained.
1,799	2.488	.....	.....	.....	3.150	1,010	15.400	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	734	11.190	Brittle. Oblique fracture 17″ long, separating stick along grain.
2.587	.....	.....	.....	.....	2.953	978	14.912	Brittle .5″ deep. Split along grain 24″, intersecting "Cooper" lines, developed 3″ either side middle bearing. Badly warped before test.
.....	.....	.....	.....	.....	.....	548	8.360	Short, brittle. Oblique fracture 5″ long, separating stick. (Photograph.)
.....	.....	.....	.....	.....	.....	767	11.690	Tough, splintering.
.....	.....	.....	.....	.....	.....	512	7.810	Brittle, oblique, 7″ long, separating stick.
.....	.....	.....	.....	.....	.....	772	11.770	Brittle, oblique, 15″ long, separating stick.
.....	.....	.....	.....	.....	.....	882	13.450	Square, brittle, .4″ deep. Oblique fractures along grain separate stick into 3 pieces.
1.280	1.614	2.284	.....	.....	.....	1,108	16.900	Short, brittle, .5″ deep. Split along grain 27″.
.....	.....	.....	.....	.....	.....	824	12.570	Square, brittle, .5″ deep. Split along grain 24″.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
948a	.7813	15		.217	.453	.709	1.032	.094	1.043	1.378	1.850	2.539
948b	.8125	13		.213	.394	.591	.827	.043	.827	1.122	1.496	1.988
438a	.7083	10		.197	.354	.532	.748	.039	.768	.969	1.276	1.654
536a	.4758	7		.433	.807	1.319	2.055	.276	2.205	.....	.....	.....
125a	.5188	28		.260	.512	.795	1.158	.083	1.201	1.693	.....	.....
125b	.5205	20		.303	.559	.866	1.260	.079	1.299	1.732	.....	.....
66a	.8424	9		.236	.488	.768	1.071	.079	1.102	1.496	2.047	2.854
66b	.8020	12		.228	.433	.669	.913	.055	.945	1.228	1.622	2.303
291a	.6080	20		.295	.551	.843	1.205	.091	1.260	1.614	2.323	.....
408a	.5371	21		.244	.492	.748	1.063	.059	1.102	1.417	.....	.....
518a	.7922	6		.315	.591	.921	1.299	.138	1.378	1.831	2.618	.....
286a	.7989	13		.197	.374	.563	.760	.024	.787	.984	1.228	1.496
286a	.7915	7		.276	.551	.827	1.165	.106	1.260	1.740	2.598	.....
964a	.6182	11		.205	.406	.591	.819	.028	.846	1.102	1.535	.....
964b	.6057	11		.228	.410	.630	.866	.035	.886	1.181	1.614	.....
1001a	.6284	9		.217	.421	.638	.850	.020	.886	1.102	1.417	.....
1001b	.6000	15		.260	.492	.736	1.012	.039	1.024	1.339	1.791	.....
1024a	.4895	16		.402	.811	.....	.....	.....	.....	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	890	13.570	Tough splintering, slightly oblique. One end bearing indented corner.
3.543	.....	.....	.....	.....	.....	928	14.150	Tough, splintering; intersecting "Cooper" lines developed on compression side.
2.402	.....	.....	.....	.....	.....	905	13.800	Tough, splintering.
.....	.....	.....	.....	.....	.....	505	7.700	Short, brittle, square across. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	638	9.730	Brittle, oblique, 14" long, separating stick. Several cracks along grain.
.....	.....	.....	.....	.....	.....	595	9.070	Short, brittle. Triangular piece 28" long nearly detached compression side.
.....	.....	.....	.....	.....	.....	895	13.650	Splintering. Fibers crushed at knot. Drew off end bearings.
.....	.....	.....	.....	.....	.....	893	13.620	Splintering. Fibers crushed at knot.
.....	.....	.....	.....	.....	.....	690	10.520	Short, brittle. Opened cracks along grain on tension half of stick. (Photograph.)
.....	.....	.....	.....	.....	.....	658	10.030	Long, oblique, beginning at corner opposite middle bearing. Cracks followed dark lines in wood to end of stick.
.....	.....	.....	.....	.....	.....	688	10.490	Coarse, splintering; failed at knot.
1.850	2.402	.....	.....	.....	.....	1,038	15.830	Splintering. Cross-grained.
.....	.....	.....	.....	.....	.....	672	10.250	Failed at knots, tension side. (Photograph.)
.....	.....	.....	.....	.....	.....	772	11.770	Short, splintering, 3" deep. Cracked along grain.
.....	.....	.....	.....	.....	.....	712	10.860	Oblique, coarse splintering. Sap.
.....	.....	.....	.....	.....	.....	756	11.530	Oblique, brittle, 9" long. Cross-grained.
.....	.....	.....	.....	.....	.....	685	10.450	Do.
.....	.....	.....	.....	.....	.....	330	5.030	Brittle. Oblique fracture 4½" long. Cross-grained.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1024*b*	.4831	20		.453	.906	.....	.....	.....	.....	.....	.....	.....
1030*a*	.6430	9		.181	.354	.512	.709	.024	.728	.925	1.189	.....
1030*b*	.6419	6		.157	.315	.492	.669	.016	.681	.858	.....	.....
122*a*	.5217	22		.236	.472	.748	1.043	.063	1.130	1.535	.....	.....
147	.7371	12		.197	.362	.551	.811	.067	.827	1.102	1.417	1.929
839*a*	.7364	15		.217	.453	.709	1.024	.098	1.083	1.445	2.087	3.209
839*b*	.7574	15		.236	.504	.866	1.228	.154	1.339	1.890	2.795	.....
737*a*	.5874	5		.315	.650	1.043	1.524	.177	1.654	2.402	.....	.....
737*b*	.5814	4		.220	.472	.709	1.063	.079	1.110	1.496	2.529	.....
283*a*	.8702	Close grained.		.157	.287	.441	.602	.016	.618	.787	.965	1.220
283*b*	.8455	....do.....		.181	.315	.500	.701	.039	.709	.925	1.181	1.457
584	.7330	13		.177	.339	.512	.709	.039	.717	.925	1.181	1.555
1137*a*	.7984	9		.217	.386	.575	.780	.020	.787	.984	1.260	1.575
942	.6649	4		.453	.969	1.417	2.087	.272	2.205	3.051	3.976	.....
540	.4816	3		.287	.551	.846	1.220	.094	1.280	1.732	.....	.....
744*a*	.4413	3		.335	.630	1.024	1.480	.177	1.614	.....	.....	.....
744*b*	.4351	3		.339	.724	1.220	2.480	.689	.....	.....	.....	.....
744*c*	.4584	2		.236	.433	.709	.992	.055	1.024	1.378	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1223		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
						831	5.050	Short, brittle, ".7 deep. Split along grain detaching piece 7" long.
						695	10.600	Oblique, 20" long, beginning at corner.
						720	10.980	Short, brittle, ".4 deep. Oblique crack 9" long, separating stick.
						576	8.780	Brittle, splintering. Opened cracks along grain.
2.913					3.150	920	14.028	Square, brittle, ".4 deep. Split along grain 18". Fibers crushed at knot.
						772	11.770	Coarse, oblique splintering.
						764	11.650	Do.
						658	10.030	Square, brittle, ".5 deep. Oblique fracture separating stick into 3 pieces.
						690	10.520	Square, brittle, ".5 deep. Triangular piece 14" long detached.
1.457	1.811	2.382				1,130	17.230	Tough, splintering. Fibers crushed, intersecting "Cooper" lines.
1.890						954	14.550	Long, oblique, splintering, beginning at corner.
2.165						882	13.450	Coarse, splintering.
1.969						890	13.572	Brittle, splintering. ".5 deep.
						680	10.370	Square, brittle, ".5 deep. Cracked along grain.
						641	9.770	Coarse, splintering. Fibers crushed.
						496	7.550	Do.
						441	6.720	Oblique, splintering. Fibers crushed.
					2.480	651	9.930	Brittle. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
38a	.4915	8		.244	.453	.669	.925	.047	.957	1.307	.....	.....
38b	.4915	8		.252	.484	.803	1.181	.102	1.209	2.087	.....	.....
682	.6190	Uncertain		.374	.748	1.244	1.972	.236	.....	.....	.....	.....
682a	.5716	7		.346	.669	1.024	1.457	.118	1.496	2.126	.....	.....
490a	1.0321	17		.165	.327	.492	.689	.028	.709	.906	.....	.....
490b	1.0359	16		.146	.287	.449	.591	.016	.618	.787	.984	1.181
474	.6884	....		.413	.827	.....	.....	.....	.....	.....	.....	.....
473a	.9718	Slow growth.		.165	.315	.488	.661	.016	.689	.846	1.043	1.260
473b	.9751	...do		.189	.366	.532	.748	.032	.736	.945	1.220	1.535
585a	.6426	11		.236	.445	.709	.957	.039	.984	1.220	1.575	1.969
585b	.6489	11		.230	.472	.693	.957	.047	.953	1.189	1.575	2.008
340a	.6216	4		.236	.453	.654	.920	.051	.945	1.260	1.654	2.264
71a	.5284	12		.339	.685	1.102	1.602	.177	1.732	2.598	.....	.....
71b	.4568	21		.335	.614	.921	1.331	.106	1.398	1.870	3.150	.....
387a	.4546	15		.433	.827	1.398	.....	.....	.....	.....	.....	.....
387b	.4818	13		.315	.591	.913	1.339	.122	1.417	.....	.....	.....
446a	.4823	15		.295	.571	.866	1.280	.079	1.339	1.850	.....	.....
814a	.5849	9		.339	.709	1.165	1.772	2.44	1.811	2.913	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
						632	9.640	Splintering. Fibers crushed.
						560	8.540	Do.
						441	6.720	Cross-grained, fractures started at corners, splitting along grain 8".
					2.756	648	9.880	Oblique fractures beginning at corners.
						662	10.090	Failed at knots 7" from middle. Cross-grained.
1.457	1.811					1,100	16.770	Fine, splintering.
						280	4.270	Olique. Stick worm-eaten.
						882	13.450	Brittle, cracked along grain. Grain curly.
						845	12.880	Do.
						868	13.240	Square break ".7 deep. Opened cracks along grain.
						832	12.690	Coarse, splintering, oblique direction.
						772	11.770	Oblique, splintering. Fibers crushed.
						612	9.330	Square, brittle, ".4 deep. Cracked along grain.
						666	10.150	Long, splintering.
						340	5.180	Oblique, brittle.
						551	8.400	Coarse, splintering.
						620	9.450	Coarse, splintering. Fibers crushed.
						565	8.610	Coarse, splintering. Cracked from middle to end. Knot 1" from middle bearing.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
814*b*	.5828	8		.394	.768	1.181	1.654	.103	1.799	2.480	.....	.....
854*a*	.4830	17		.551	1.142	1.850	.....	.....	.....	.....	.....	.....
854*b*	.5034	13		.591	1.220	2.047	.....	.....	.....	.....	.....	.....
703*a*	.6812	14		.177	.335	.492	.669	.024	.709	.886	1.161	1.457
703*b*	.6755	16		.217	.390	.618	.827	.043	.846	1.083	.....	.....
468*a*	.9304	Slow growth.		.197	.370	.575	.787	.059	.811	1.024	1.323	.....
459*a*	.9389	...do....		.228	.441	681	.965	.063	.984	1.280	.....	.....
459*b*	.9216	...do.....		.256	.480	.772	1.071	.079	1.083	1.437	1.831	.....
324*a*	.6706	...do		.256	.492	.787	1.142	.087	1.181	1.654	2.205	.....
324*b*	.7348	...do.....		.236	.433	.661	.925	.051	.965	1.220	1.543	.....
929*a*	.8375	9		.307	.630	1.083	1.595	.236	1.654	2.244	3.307	.....
929*b*	.8682	9		.370	.717	1.220	1.732	.256	1.850	2.559	3.819	.....
30*a*	.5875	20		.197	.394	.598	.878	.067	.929	1.201	1.850	.....
369	.6767	15		.236	.410	.610	.799	.039	.799	1.059	1.378	1.870
134*a*	.7199	8		.217	.413	.630	.898	.063	.925	1.240	1.693	2.331
134*b*	.6932	8		.189	.362	.551	.787	.039	.819	1.063	1.417	2.016
429	.6821	....		.236	.449	.669	.953	.047	.992	1.283	1.969	.....
19*a*	.6921	7		.197	.394	.591	.819	.039	.839	1.043	1.378	1.803

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTION FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	633	9.650	Brittle, splintering. Cracked along grain.
.....	.....	.....	.....	.....	.....	346	5.270	Square, brittle, ".4 deep. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	437	6.660	Square, brittle, ".5 deep. Cracked along grain.
.....	.....	.....	.....	.....	.....	882	13.450	Oblique fracture 16" long. Cross-grained.
.....	.....	.....	.....	.....	.....	634	9.670	Do.
.....	.....	.....	.....	.....	.....	748	11.410	Coarse, splintering.
.....	.....	.....	.....	.....	.....	555	8.460	Oblique, beginning at corner.
.....	.....	.....	.....	.....	.....	776	11.830	Short, brittle. Oblique fracture 22" long separating stick.
.....	.....	.....	.....	.....	.....	761	11.600	Splintering, ".75 deep.
.....	.....	.....	.....	.....	.....	690	10.520	Brittle, splintering. Stick worm-eaten.
.....	.....	.....	.....	.....	.....	740	11.280	Short, brittle. Oblique fracture 12" long. Knot near neutral axis near middle of stick.
.....	.....	.....	.....	.....	.....	716	10.920	Brittle at one corner. Oblique crack starting 8" from middle.
.....	.....	.....	.....	.....	.....	736	11.224	Splintering. Fibers crushed.
2.362	.....	.....	.....	.....	3.543	915	13.952	Brittle, splintering. Fibers crushed. Badly warped before test.
4.409	.....	.....	.....	.....	.....	882	13.450	Fine, splintering. Fibers crushed.
3.386	.....	.....	.....	.....	.....	882	13.450	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	670	10.220	Brittle, splintering. Knot tension side, near middle bearing.
2.520	.....	.....	.....	.....	.....	929	14.170	Fine, splintering. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
19b	.7080	11		.209	.410	.579	.803	.020	.827	1.063	1.366	1.799
1036a	.7370	5		.450	.984	1.634	2.724	.567	2.874	.....	.....	.....
1036b	.7358	5		.354	.748	1.220	1.819	.244	1.937	2.807	.....	.....
1040a	.7650	8		.232	.453	.689	1.004	.079	1.032	1.307	1.795	2.480
1049b	.7150	11		.236	.449	.689	.945	.075	.945	1.240	1.732	2.362
281a	.6477	8		.268	.595	.885	1.220	.122	1.220	1.614	2.362	.....
281b	.6478	10		.208	.512	.827	1.181	.118	1.220	1.616	2.421	.....
958	.6597	6		.256	.480	.708	1.102	.118	1.142	1.575	2.228	.....
958	.6168	6		.264	.461	.669	.984	.087	1.008	1.358	1.878	2.736
116a	.8562	30		.169	.323	.472	.658	.020	.669	.886	1.043	1.339
116aa	.6244	30		.236	.417	.634	.866	.024	.906	1.142	1.516	2.106
116ab	.6838	30		.169	.315	.480	.650	.016	.658	.827	1.043	1.339
116aa	.7460	30		.103	.358	.539	.717	.028	.724	.906	1.181	1.496
314a	.7677	Slow growth.		.157	.295	.433	.587	.020	.591	.748	.945	1.158
314b	.7466	...do.....		.165	.303	.461	.622	.020	.630	.799	1.024	1.260
428a	.7441	...do.....		.295	.551	.882	1.307	.138	1.378	1.772	2.520	3.602
133a	.8767	7		.425	.803	1.260	1.795	.217	1.850	2.539	3.701	.....
380a	.6615	Slow growth.		.335	.677	1.134	1.713	.283	1.791	2.335	3.368	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
2.362	.....	.....	.....	.....	.....	988	15.070	Fine, splintering.
.....	.....	.....	.....	.....	.....	541	8.250	Short, oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	610	9.300	Short, oblique. Coarse splinters.
3.866	.....	.....	.....	.....	.....	950	14.490	Fine, splintering; fibers buckled at season cracks.
.....	.....	.....	.....	.....	4.331	868	13.235	Do.
.....	.....	.....	.....	.....	.....	747	11.390	Do.
.....	.....	.....	.....	.....	.....	758	11.560	Coarse, splintering. Worm-eaten.
.....	.....	.....	.....	.....	.....	765	11.660	Fine, splintering.
.....	.....	.....	.....	.....	3.937	842	12.839	Brittle, ".4 deep. Cracked along grain, 22".
1.606	1.929	2.520	3.347	.....	.....	1.280	19.470	Fine, splintering, intersecting "Cooper" lines developed on three faces opposite middle bearing.
.....	.....	.....	.....	.....	.....	835	12.730	Splintering.
1.811	2.559	.....	.....	.....	.....	992	15.130	Fine, splintering. Fibers crushed.
1.909	2.638	.....	.....	.....	.....	1.030	15.710	Fine, splintering, oblique direction. Fibers crushed. End bearings indented opposite corners.
1.524	2.047	.....	.....	.....	.....	1.095	16.700	Fine, splintering, intersecting "Cooper" lines developed on side.
1.732	.....	.....	.....	.....	.....	974	14.850	Splintering, oblique direction. Fibers crushed.
.....	.....	.....	.....	.....	.....	819	12.490	Long, splintering.
.....	.....	.....	.....	.....	.....	700	10.675	Splintered at knot, 2½" from middle bearing.
.....	.....	.....	.....	.....	.....	662	10.090	Long splinter started from one corner.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
533a	.8243	40		.315	.591	.933	1.339	.130	1.390	1.890	2.520	3.780
533b	.7883	40		.276	.559	.906	1.272	.094	1.319	1.752	2.520	3.819
758	.5926	6		.276	.512	.783	1.071	.067	1.161	1.465	2.008	3.150
758	.5762	....		.378	.787	1.319	1.900	.236	1.953	.....	.....	.....
918a	.5114	....		.472	.925	1.535	.....	.....	.....	.....	.....	.....
75a	.5887	About 30		.315	.579	.906	1.299	.118	1.354	1.791	3.071	.....
75b	.6023	11		.244	.453	.689	.996	.075	1.024	1.319	1.890	.....
306a	.7239	4		.346	.697	1.068	1.595	.177	1.634	2.205	3.228	.....
306b	.7567	4		.402	.728	1.161	1.681	.217	1.752	2.362	3.425	.....
306	.7706	7		.256	.551	.846	1.181	.098	1.260	1.654	2.264	3.425
873a	.7728	6		.354	.681	1.142	1.654	.224	1.732	2.315	3.306	.....
873b	.7921	18		.307	.630	.992	1.480	.189	1.535	2.087	3.248	.....
1111a	.7613	7		.244	.504	.787	1.102	.091	1.142	1.469	2.008	2.913
1111b	.7154	10		.197	.410	.630	.854	.043	.878	1.181	1.504	.....
652a	.7921	9		.287	.591	.984	1.457	.209	1.496	.....	.....	.....
652b	.7882	10		.197	.354	.563	.787	.059	.795	1.043	1.394	1.969
496a	.3215	....		.606	1.496	.....	.....	.....	.....	.....	.....	.....
496b	.3060	....		.866	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
						772	11.770	Splintering near knot, 5″ from middle.
						847	12.910	Splintered along one corner tension side. Buckled at season cracks.
					3.150	772	11.770	Oblique splintering. Cracks along grain. Sap.
						540	8.230	Short, brittle, ″.3 deep. Oblique fracture, 9″ long, extending across stick.
						441	6.720	Oblique, 5″ long, across stick. Cross-grained. Sap.
						670	10.220	Coarse, splintering.
						760	11.590	Short, splintering. Fibers crushed.
						695	10.600	Failed at knot, 4″ from middle. Opened diagonal crack along grain, 18″ long.
						710	10.830	Short, brittle break ″.3 deep and ½″ in width.
						795	12.120	Opened crack between rings of growth, tension side.
						726	11.070	Oblique, brittle. End bearings indented opposite corners.
						716	10.920	Coarse, splintering.
					3.346	838	12.780	Splintered at corner, tension side.
						772	11.770	Failed at knot, 4″ from middle.
						550	8.390	Oblique, 12″ long, splitting stick. Cross-grained.
2.776					3.543	963	14.684	Fracture started 2″ from middle, running along grain in oblique direction 4″. Knot ⅝″ diameter.
						263	4.010	Oblique, brittle.
						187	2.850	Do.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
508a	.5085	.....		.669	.....	.....	.....	.....	.....	.....	.....	.....
132a	.6876	5		.185	.362	.551	.807	.051	.815	1.102	1.575	2.165
132b	.6784	6		.236	.425	.646	.906	.039	.925	1.220	1,693	2.402
1244a	.6517	6		.205	.433	.622	.890	.079	.925	1.272	1.811	.....
1245a	.6506	5		.268	.472	.728	1.047	.091	1.063	1.504	2.244	.....
1246a	.6312	4		.276	.532	.787	1.142	.102	1.193	1.654	.....	.....
1255a	.6875	7		.256	.551	.843	1.276	.102	1.268	1.701	2.756	.....
1255b	.6648	7		.303	.567	.874	1.280	.118	1.319	1.744	.....	.....
253a	.8012	10		.224	.418	.598	.795	.028	.811	1.063	1.240	1.516
253b	.7926	17		.205	.402	.598	.803	.016	.827	1.039	1.260	1.516
21	.5724	6		.472	.906	1.496	2.193	.362	.....	.....	.....	.....
126a	.6125	10		.217	.394	.571	.772	.039	.819	.984	1.299	.....
126b	.6295	7		.169	.323	.484	.669	.024	.689	.890	.....	.....
686a	.5170	3		.307	.618	.961	1.449	.138	1.508	2.480	.....	.....
686b	.4812	4		.323	.614	.969	1.585	.193	1.614	.....	.....	.....
648a	.5170	7		.472	.906	1.524	.....	.....	.....	.....	.....	.....
648b	.4812	6		.358	.787	1.346	.....	.....	.....	.....	.....	.....
16a	.4830	.....		.303	.591	.906	.....	.....	.....	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	215	3.280	Oblique, 6″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	882	13.450	Brittle and splintering.
.....	.....	.....	.....	.....	.....	798	12.170	Brittle at one corner, opening cracks along grain.
.....	.....	.....	.....	.....	.....	720	10.980	Coarse, splintering.
.....	.....	.....	.....	.....	.....	695	10.600	Do.
.....	.....	.....	.....	.....	.....	655	9.990	Coarse, splintering. ".4 deep.
.....	.....	.....	.....	.....	.....	700	10.670	Do.
.....	.....	.....	.....	.....	.....	658	10.030	Do.
1.350	2.221	.....	.....	.....	.....	1.044	15.920	Coarse, long, splintering.
1.382	2.284	.....	.....	.....	.....	1.062	16.500	Long, splintering along one edge. Small knot ½″ from middle.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique, 8″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	745	11.360	Oblique, brittle. Split along grain.
.....	.....	.....	.....	.....	.....	605	9.220	Do.
.....	.....	.....	.....	.....	.....	552	8.420	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	505	7.700	Coarse, splintering. Fibers crushed. Wood season cracked.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique, 15″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	365	5.560	Oblique, 11″ long. Began at knot 2″ from middle.
.....	.....	.....	.....	.....	.....	347	5.290	Oblique, 5″ long. Cross-grained.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
16b	.4579	.....		.252	.488	.748	1.083	.079	1.102	1.504	.....	.....
1057	.5284	12		.236	.472	.697	.945	.039	.969	1.220	1.575	.....
76a	.4318	10		.236	.433	.661	.898	.035	.945	1.248	.....	.....
76b	4375	12		.201	.378	.571	.799	.024	.827	1.118	.....	.....
76aa	.4943	9		.169	.315	.488	.669	.035	.709	.957	.....	.....
123a	.3864	16		.276	.551	.728	1.063	.079	1.142	.....	.....	.....
393a	.3204	5		.394	.906	.....	.....	.....	.....	.....	.....	.....
112a	.5852	6		.213	.370	.551	.748	.012	.756	.945	1.161	1.402
117a	.5852	18		.213	.394	.583	.803	.024	.807	1.004	1.272	.....
318a	.6619	8		.197	.394	.591	.850	.024	.854	.....	.....	.....
149a	.6031	14		.220	.394	.606	.850	.051	.858	1.169	1.654	.....
430	.5724	12		.224	.417	.630	.866	.028	.906	1.110	1.457	1.949
325	.6455	7		.197	.413	.630	.862	.039	.854	1.102	.....	.....
951a	.7483	2		.157	.328	.500	.689	.039	.709	.906	1.161	1.543
951b	.7386	2		.205	.378	.591	.827	.059	.835	1.102	1.417	1.949
407a	.5982	12		.197	.339	.512	.689	.008	.697	.894	1.122	1.496
766	.6932	5		.157	.315	.496	.709	.047	.736	.945	1.260	1.638
766	.6949	{Not well defined.}		.118	.236	.386	.520	.008	.532	.669	.827	1.024

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
						628	9.580	Brittle, ".5 deep. Fibers crushed. Opened cracks along grain.
						770	11.740	Coarse, splintering.
						645	9.830	Short, brittle, ".4 deep. Fibers crushed. Opened cracks along grain.
						610	9.300	Long, splintering. Fibers crushed.
						655	9.990	Brittle and splintering. Fibers crushed.
						528	8.050	Short, brittle, 1".4 deep. Fibers crushed.
						308	4.700	Short, brittle, ".75 deep. Broke 1½" from middle at dull spot in wood.
1.712						968	14.760	Brittle, splintering.
						720	10.980	Oblique, 15" long. Cross-grained.
						551	8.400	Oblique, 10" long. Cross-grained.
						684	10.430	Brittle, splintering. Broke at knot 1" from middle.
						845	12.880	Brittle, irregular break at middle. Crack along center splitting stick in halves.
						629	9.590	Oblique, beginning at corner, tension side.
						870	13.270	Broke 6" from middle. Cross-grained.
						882	13.450	Long, oblique. Fibers crushed. Cross-grained.
						869	13.250	Brittle, splintering. Fibers crushed.
						772	11.760	Brittle, ".5 deep. Split along grain.
1.260	1.575					1.070	16.320	Irregular, brittle, ".9 deep. Split along grain.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
415a	.7297	6		.291	.567	.846	1.142	.097	1.158	1.516	1.969	2.697
415b	.6125	5		.276	.559	.906	.....	.....	.....	.....	.....	.....
672a	.5977	6		.248	.457	.677	.945	.089	.....	.....	.....	.....
672b	.6062	7		.307	.551	.846	1.181	.063	1.228	.....	.....	.....
322a	.7443	20		.299	.591	.906	.....	.....	.....	.....	.....	.....
322	.7489	16		.213	.394	.618	.843	.035	.850	1.102	.....	.....
326a	.7182	13		.410	.776	1.260	2.028	.346	2.142	.....	.....	.....
326b	.6250	16		.354	.709	1.154	1.693	.209	1.732	2.402	.....	.....
3a	.8295	12		.138	.283	.449	.630	.016	.638	.819	1.075	1.358
3b	.7955	13		.146	.283	.425	.567	.016	.571	.717	.925	1.181
1056a	.8644	9		.240	.394	.575	.787	.035	.803	1.032	1.378	1.772
1056b	.8439	17		.217	.417	.630	.890	.075	.906	1.193	1.583	2.126
29i	.9716	27		.165	.315	.480	.669	.035	.693	.906	1.161	1.417
152	.8216	.....		.118	.236	.362	.492	.008	.504	.630	.768	.945
1097a	.8261	18		.138	.256	.378	.492	.012	.512	.630	.795	.984
1097b	.7522	14		.157	.283	.413	.559	.020	.567	.709	.886	1.138
118a	.8034	17		.122	.248	.354	.476	.008	.488	.610	.748	.906
118a2	.8085	22		.142	.276	.413	.551	.024	.559	.693	.854	1.043

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
4.409	.....	.....	.....	.....	5.118	898	13.616	Long, oblique, coarse, splintering. Sap.
.....	.....	.....	.....	.....	.....	435	6.630	Long, oblique, 9″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	441	6.720	Broke at knot 11½″ from middle.
.....	.....	.....	.....	.....	.....	490	7.470	Oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	430	6.560	Brittle, ″.4 deep. Stick worm-eaten.
.....	.....	.....	.....	.....	.....	634	9.670	Split along grain from end to end between rings of growth.
.....	.....	.....	.....	.....	.....	546	8.320	Failed at knot 4″ from middle.
.....	.....	.....	.....	.....	.....	565	8.610	Short, brittle, ″.2 deep, split along grain.
1.998	2.284	3.425	.....	.....	5.521	1,170	17.840	Fine, splintering, intersecting "Cooper" lines developed on side. Heart.
1.457	1.996	2.953	.....	.....	4.921	1,175	17.920	Fine, splintering, intersecting "Cooper" lines developed on side. Sap.
2.284	3.189	.....	.....	.....	.....	1,070	16.320	Short, splintering. Sap.
2.933	4.134	.....	.....	.....	6.299	1,010	15.400	Do.
1.732	2.378	3.228	.....	.....	.....	1,192	18.180	Long, fine splintering.
1.142	1.457	.....	.....	.....	.....	1,064	16.220	
1.209	1.496	1.949	2.903	.....	3.543	1,253	19.110	Long, fine splintering, covering half of one face. One end bearing indented on corner. 10 per cent. sap.
1.457	1.890	2.756	.....	.....	2.756	1,102	16.800	Fine, splintering. Heart.
1.161	.....	.....	.....	.....	.....	975	14.870	Short splintering.
1.260	1.811	.....	.....	.....	.....	995	15.170	Brittle, ″.3 deep. Split along grain. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
249a	.8108	15		.157	.323	.512	.717	.039	.748	.984	1.299	1.693
249b	.8040	13		.177	.331	.500	.661	.024	.681	.846	4.122	1.441
249c	.8163	20		.157	.291	.441	.602	.032	.606	.756	1.012	1.319
816a	.7569	20		.126	.236	.354	.472	.008	.492	.630	776	.965
816b	.7947	15		.118	.236	.339	.453	.012	.453	.559	.717	.886
531a	.8835	24		.146	.260	.394	.512	.008	.520	.654	.827	1.004
531b	.8829	24		.142	.276	.402	.520	.012	.532	.669	.827	1.034
531c	.8746	24		.126	.240	.354	.472	.012	.480	.602	.748	.925
589a	.9148	23		.150	.252	.378	.492	.012	.512	.622	.795	.945
589b	.7699	15		.130	.244	.362	.496	.008	.512	.638	.787	.984
91a	.7131	20		.197	.362	.551	.728	.016	.748	.953	1.213	1.614
91a2	.6603	20		.264	.492	.728	1.032	.055	1.063	1.417	1.969	.....
383a	.9375	8		.256	.457	.693	.964	.079	1.028	1.323	1.780	2.362
383b	.9332	6		.291	.528	.846	1.201	.126	1.220	1.575	2.067	4.685
383c	.9421	6		.205	.354	.520	.720	.039	.752	.984	1.286	1.689
391a	.8886	22		.220	.402	.591	.807	.043	.827	1.102	1.417	1.811
391b	.8648	12		.205	.382	.579	.787	.039	.811	1.043	1.339	1.693
1062a	.9000	30		.260	.453	.634	.874	.039	.890	1.181	1.575	2.126

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
2.205	2.992	.....	.....	.....	.....	1,075	16.390	Fine, splintering.
1.811	2.520	.....	.....	.....	.....	1,090	16.620	Long, fine splintering. Fibers crushed. (Photograph.)
1.772	2.244	3.307	.....	.....	4.094	1,168	17.810	Long, fine splintering, intersecting "Cooper" lines developed.
1.201	.....	.....	.....	.....	.....	980	14.940	Brittle, splintering. Heart.
1.122	1.417	1.949	.....	.....	.....	1,145	17.460	Brittle, splintering, "Cooper" lines developed on sides. Heart.
1.299	1.614	2.165	3.987	.....	.....	1,213	18.480	Long, fine splintering, intersecting "Cooper" lines developed. Heart.
1.299	1.598	2.165	.....	.....	.....	1,212	18.480	Do.
1.118	1.378	1.752	2.323	3.465	4.331	1,358	20.710	Long, fine splintering, intersecting "Cooper" lines developed. (Photograph.)
1.161	1.535	2.126	.....	.....	.....	1,168	17.810	Fine, splintering. Fibers crushed. "Cooper" lines developed. Small knots near middle.
1.240	1.575	2.343	.....	.....	.....	1.164	17.750	Fine, splintering. Fibers crushed .20 per cent. heart wood compression side.
2.189	.....	.....	.....	.....	.....	961	14.650	Square, brittle, ".2 deep. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	710	10.830	Do.
3.347	5.197	.....	.....	.....	.....	1,056	16.100	Took maximum deflection starting splinters.
7.638	.....	.....	.....	.....	.....	992	15.130	Took maximum deflection without fracturing fibers.
2.146	2.953	.....	.....	.....	4.528	1,092	16.650	Fine, splintering along one edge. End bearings indented one edge. Middle bearing indented, opposite edge.
2.323	3.583	7.284	.....	.....	.....	1,102	16,800	Fine, splintering.
2.421	3.307	.....	.....	.....	.....	1,050	16.010	Do.
3.032	5.118	.....	.....	.....	7.480	1,022	15.580	Took maximum deflection, starting fibers at one corner.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
1082*b*	.8834	30		.291	.461	.630	.839	.043	.866	1.083	1.417	1.850
1164	.7926	16		.157	.323	.472	.650	.024	.654	.827	1.083	1.378
1164*a*	.8481	18		.142	.252	.374	.504	.016	.500	.630	.787	.965
1164*b*	.7761	20		.157	.276	.402	.535	.016	.551	.685	.866	1.079
1165	.7182	17		.157	.315	.458	.614	.020	.630	.787	.984	.....
1166	.8881	11		.205	.382	.591	.819	.051	.827	1.102	1.465	1.969
1170	.7636	10		.157	.276	.413	.532	.197	.551	.709	.945	1.969
254*a*	.8693	17		.130	.236	.354	.480	.012	.480	.591	.752	.894
72*a*	.7586	20		.218	.406	.602	.866	.055	.906	1.165	1.634	2.284
72*b*	.8056	12		.197	.354	.543	.772	.043	.787	1.024	1.299	1.732
348*a*	.8659	16		.236	.410	.614	.843	.043	.866	1.102	1.461	1.850
6*a*	.8159	15		.217	.394	.571	.803	.039	.807	1.063	1.339	1.732
6*b*	.7818	25		.197	.362	.559	.787	.043	.815	1.032	1.378	1.740
1051*a*	.8750	12		.193	.350	.528	.728	.051	.748	.965	1.220	1.673
1051	.8636	14		.169	.327	.512	.693	.039	.720	.921	1.220	1.634
88*a*	.9659	12		.154	.276	.429	.559	.020	.591	.728	.929	1.220
88*b*	.9369	18		.185	.335	.492	.689	.043	.709	.886	1.193	1.476
288*a*	.8473	16		.197	.354	.539	.709	.035	.748	.929	1.205	1.575

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
2.480	3.740	.....	.....	.....	4.331	1,018	15.520	Splintering, ″.3 deep half way across, intersecting "Cooper" lines developed compression side in heart wood.
1.772	2.618	.....	.....	.....	.....	1,076	16.410	Long, fine, splintering, intersecting "Cooper" lines developed on 3 faces. Heart wood.
1.193	1.457	1.811	2.559	.....	3.543	1.272	19.400	Do.
1.307	1.677	2.205	.....	.....	3.543	1.210	18.450	Long, fine, splintering, intersecting "Cooper" lines developed on 3 faces. Ten per cent. sap wood, tension side. (Photograph.)
.....	.....	.....	.....	.....	.....	735	11.210	Coarse, splintering. Heart.
2.736	5.394	.....	.....	.....	7.874	1,020	15.550	Took maximum deflection, slightly starting fibers, tension side.
.....	.....	.....	.....	.....	.....	959	14.620	Fine, splintering, intersecting "Cooper" lines developed compression side.
1.079	1.299	1.575	1.969	.....	2.362	1,328	20.250	Coarse, splintering, 40 per cent. heart wood compression side.
.....	.....	.....	.....	.....	.....	865	13.190	Short, brittle, ″.1 deep.
2.441	.....	.....	.....	.....	.....	979	14.930	Fine, splintering.
2.402	3.504	.....	.....	.....	5.118	1,078	16.440	Oblique, splintering. End bearings indented opposite corners.
2.264	3.098	.....	.....	.....	.....	992	15.130	Coarse, splintering of sap wood, 5 per cent. sap wood.
2.362	.....	.....	.....	.....	.....	992	15.130	Short, splintering. Sap.
2.205	2.972	.....	.....	.....	.....	1,044	15.920	Splintering. Heart.
2.205	3.110	.....	.....	.....	5.512	1,095	16.700	Long, fine, splintering, 40 per cent. sap wood, tension side.
1.417	1.811	2.370	2.992	.....	.....	1,274	19.430	Long, fine, splintering. Heart.
1.929	2.598	.....	.....	.....	.....	1,102	16.800	Do.
2.047	2.559	.....	.....	.....	3.543	1,078	16.440	Coarse, splintering. Sap

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
1098*a*	.8614	24		.217	.472	.740	1.083	.118	1.122	1.480	2.067	2.756
1098*b*	.8114	20		.268	.512	.756	1.102	.102	1.134	1.476	2.032	2.874
1168*a*	.8580	22		.291	.589	.827	1.240	.197	1.280	1.630	2.244	3.347
1168*b*	.8500	22		.240	.437	.634	.906	.087	.953	1.244	1.614	2.165
1211*a*	.6659	16		.177	.315	.472	.638	.024	.654	.839	1.102	1.504
442*a*	.8452	17		.256	.472	.748	1.051	.079	1.102	1.417	1.850	.....
538*a*	.6982	28		.181	.350	.500	.673	.024	.669	.906	1.181	1.555
538*b*	.7463	24		.177	.315	.457	.618	.035	.646	.835	1.126	1.433
538*c*	.8182	14		.181	.315	.469	.630	.024	.630	.827	1.063	1.378
158	.8153	11		.185	.354	.524	.748	.039	.724	.945	1.232	1.634
838*a*	.7863	8		.252	.472	.728	1.035	.087	1.083	1.457	1.988	2.776
838*b*	.8040	8		.201	.354	.551	.748	.043	.748	.972	1.280	1.673
838*c*	.8080	12		.177	.339	.539	.724	.024	.736	.945	1.205	1.535
287*a*	.8636	14		.157	.295	.441	.575	.020	.591	.748	.933	1.181
287*b*	.8356	14		.130	.236	.354	.457	.004	.472	.579	.713	.866
129*a*	.7386	10		.181	.331	.472	.650	.039	.650	.866	1.142	1.476
362*a*	.7545	8		.295	.551	.827	1.201	.118	1.228	1.622	2.252	3.386
362*b*	.7727	7		.197	.406	.598	.846	.047	.866	1.181	1.654	2.224

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
4.331	.....	.....	.....	.....	.....	907	13.380	Coarse, splintering. Heart.
.....	.....	.....	.....	.....	.....	880	13.420	Do.
.....	.....	.....	.....	.....	.....	858	13.080	Coarse, splintering. Opened cracks along grain. Heart.
2.874	4.134	.....	.....	.....	4.134	992	15.130	Coarse, splintering. Opened cracks along grain. Heart. (Photograph.)
.....	.....	.....	.....	.....	.....	825	12.580	Short, splintering. Heart.
.....	.....	.....	.....	.....	.....	758	11.560	Failed at knot 3" from middle. Sap.
.....	.....	.....	.....	.....	.....	874	13.330	Square fracture ".4 deep. Opened cracks along grain. Sap.
1.929	2.677	.....	.....	.....	3.268	1,045	15.980	Fine, splintering. Sap.
1.732	2.362	.....	.....	.....	.....	1,028	15.680	Splintering and brittle.
2.221	3.307	.....	.....	.....	5.315	1,064	16.220	Fine, splintering. Fibers crushed. Heart.
.....	.....	.....	.....	.....	.....	880	13.420	Long splintering half across tension side. End bearings indented opposite corners.
2.232	2.963	.....	.....	.....	.....	1,057	16.120	Do.
2.008	2.697	4.055	.....	.....	5.118	1,142	17.410	Fine, splintering. Heart.
1.417	1.772	2.303	3.032	.....	.....	1,218	18.570	Long, fine, splintering, intersecting "Cooper" lines compression side.
1.024	1.228	1.516	1.890	2.480	3.347	1,405	21.420	Do.
2.067	2.835	.....	.....	.....	.....	1,000	15.250	Short, brittle, ".5 deep. Started cracks along grain. Piece 10" long flew out of tension side.
.....	.....	.....	.....	.....	.....	867	13.220	Coarse, splintering. 20 per cent. sapwood tension side.
3.228	.....	.....	.....	.....	.....	882	13.450	Short, splintering. Opened crack along grain. Sap.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
362c	.7813	9		.197	.394	.579	.795	.043	.827	1.083	1.427	1.929
740a	.8198	11		.197	.354	.532	.709	.028	.717	.925	1.189	.....
740b	.8470	8		.157	.284	.425	.517	.016	.591	.709	.874	1.063
740	.8199	....		.177	.374	.650	1.043	.157	.....	.....	.....	.....
917	.6415	{Not well defined.}		.264	.465	.669	.906	.036	.929	.....	.....	.....
586a	.6227	5		.236	.433	.685	.945	.051	.945	1.240	1.654	.....
665a	.6511	16		.213	.394	.567	.783	.039	.787	.992	1.260	1.575
665b	.6625	16		.197	.382	.579	.787	.039	.803	1.024	1.299	1.669
8b	.7432	4		.283	.532	.835	1.209	.122	1.260	1.654	2.323	.....
8c	.8358	10		.252	.433	.658	.925	.059	.945	1.220	1.575	2.047
3 a	.8006	9		.169	.339	.512	.693	.016	.709	.906	1.201	1.539
33a	.7068	10		.236	.413	.591	.815	.039	.846	1.110	1.457	1.870
33a	.6584	20		.213	.406	.610	.846	.028	.850	1.102	1.457	.....
49a	.7926	30		.197	.374	.567	.787	.039	.787	1.032	1.339	1.713
49b	.7060	15		.260	.512	.803	1.181	.126	1.201	1.614	2.264	.....
49a	.7784	13		.220	.413	.669	.945	.098	1.000	1.319	1.772	2.343
49a	.7500	24		.236	.472	.748	1.102	.130	1.130	1.457	1.890	.....
49a	.7614	11		.220	.421	.650	.921	.071	.945	1.220	1.673	2.165

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
2.677	4.291	.....	.....	.....	5.512	1,084	15.770	Fine, splintering. Sap.
.....	.....	.....	.....	.....	.....	740	11.280	Oblique. Cross-grained. 10 per cent heart wood compression side.
1.299	1.575	1.858	.....	.....	2.165	1,162	17.720	Oblique. Cross-grained. Heart.
.....	.....	.....	.....	.....	.....	441	6.720	Failed at knot 6″ from middle.
.....	.....	.....	.....	.....	.....	528	8.050	Square, brittle, ″.8 deep. Short, oblique fracture separating specimen.
.....	.....	.....	.....	.....	2.165	768	11.710	Coarse, splintering. Cross-grained.
1.969	.....	.....	.....	.....	.....	992	15.130	Short, brittle, ″.7 deep. Oblique fractures along grain.
2.362	.....	.....	.....	.....	3.150	956	14.580	Brittle, splintering. Oblique fractures along grain. Fibers crushed.
.....	.....	.....	.....	.....	.....	736	11.220	Brittle, ″.3 deep. Opened cracks along grain.
.....	.....	.....	.....	.....	3.543	864	13.170	Square, brittle, ″.3 deep. Oblique crack, 17″ long, splitting off end.
1.909	.....	.....	.....	.....	.....	968	14.760	Brittle, ″.3 deep, opening cracks along grain.
.....	.....	.....	.....	.....	.....	858	13.080	Brittle, splintering.
.....	.....	.....	.....	.....	.....	770	11.740	Irregular, brittle.
2.264	.....	.....	.....	.....	.....	964	14.700	Splintering.
.....	.....	.....	.....	.....	.....	770	11.740	Short, brittle, ″.3 deep. Opened crack along grain.
3.504	.....	.....	.....	.....	.....	882	13.450	Splintering, ″.3 deep.
.....	.....	.....	.....	.....	.....	765	11.660	Square, brittle, ″.3 deep.
.....	.....	.....	.....	.....	.....	868	13.240	Irregular, brittle, ″.3 deep.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
113*a*	.6000	30		.283	.551	.906	1.307	.157	1.358	1.929	.....	.....
113₂*a*	.7148	30		.236	.429	.638	.894	.059	.917	1.280	.....	.....
113₂*b*	.7060	20		.224	.496	.787	1.213	.118	1.240	.....	.....	.....
113₃	.7460	9		.197	.394	.650	.953	.098	.984	1.260	1.654	2.284
238*a*	.8085	9		.142	.283	.433	.602	.197	.606	.807	1.043	1.299
238*b*	.7796	10		.157	.315	.472	.630	.020	.642	.827	1.063	1.378
250*a*	.7875	13		.165	.315	.472	.642	.024	.654	.835	1.122	1.417
250*b*	.7796	12		.181	.323	.500	.689	.028	.697	.886	1.181	1.437
251*a*	.7102	20		.236	.457	.709	1.024	.087	1.043	1.425	2.165	.....
251*b*	.7170	18		.165	.315	.472	.630	.012	.634	.827	1.063	1.319
259¹*a*	.8091	30		.197	.394	.630	.898	.059	.945	1.201	1.555	2.106
259²*a*	.7631	20		.220	.417	.642	.913	.059	.945	1.260	1.661	2.343
403*a*	.7364	16		.197	.394	.602	.858	.059	.874	1.161	1.606	.....
403*b*	.7144	16		.228	.453	.701	.996	.087	1.063	1.437	.....	.....
443*a*	.6649	30		.339	.650	1.024	1.638	.220	1.713	.....	.....	.....
547	.8475	8		.193	.378	.571	.815	.051	.839	1.122	1.476	1.949
547	.8579	8		.197	.327	.480	.630	.024	.638	.815	1.024	1.280
748*a*	.8075	11		.157	.307	.457	.630	.020	.642	.807	1.063	1.319

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	646	9.850	Short, brittle, ".4 deep. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	648	9.880	Brittle, splintering, ".5 deep. Small worm hole at fracture.
.....	.....	.....	.....	.....	.....	550	8.390	Irregular, brittle, ".5 deep.
3.347	.....	.....	.....	.....	.....	920	14.030	Fine, splintering, intersecting "Cooper" lines developed in three places, compression side.
1.791	.....	.....	.....	.....	.....	992	15.130	Long, fine, splintering. Fibers crushed.
1.831	2.480	.....	.....	.....	.....	992	15.130	Long, fine, splintering.
1.937	.....	.....	.....	.....	.....	986	15.036	Fine, splintering. Slight crushing.
.....	.....	.....	.....	.....	.....	874	13.330	Long, oblique.
.....	.....	.....	.....	.....	.....	718	10.950	Short, brittle. ".3 deep.
1.752	2.421	.....	.....	.....	2.756	995	15.170	Coarse, splintering.
2.756	.....	.....	.....	.....	.....	980	14.940	Fine, splintering. "Cooper" lines developed compression side.
.....	.....	.....	.....	.....	.....	795	12.120	Coarse, splintering.
.....	.....	.....	.....	.....	.....	680	10.370	Brittle, splintering. Worm-eaten.
.....	.....	.....	.....	.....	.....	615	9.380	Brittle, splintering.
.....	.....	.....	.....	.....	.....	460	7.010	Brittle. ".5 deep. Oblique crack 8" long separating stick.
2.717	.....	.....	.....	.....	.....	970	14.790	Splintering.
1.602	1.917	2.658	.....	.....	3.347	1,204	18.360	Splintering. (Photograph.)
1.693	2.205	.....	.....	.....	2.756	1,058	16.130	Fine, splintering. Cross-grained.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
743b	.8099	9		.146	.295	.433	.591	.020	.610	.772	.984	1.269
749a	.8233	15		.256	.496	.740	1.004	.087	1.083	1.358	1.791	2.559
749b	.8655	20		.236	.492	.787	1.142	.118	1.181	1.654	2.874	.....
895a	.7907	16		.260	.465	.689	.972	.039	.984	1.319	.....	.....
895b	.7818	20		.276	.532	.811	1.142	.079	1.165	1.535	.....	.....
1050a	.8001	16		.173	.323	.500	.673	.028	.689	.878	1.122	1.457
1050b	.8348	16		.244	.512	.768	1.102	.094	1.122	1.417	1.969	2.697
1257a	.8466	20		.154	.303	.461	.630	.016	.650	.827	1.043	1.319
1257b	.8773	18		.181	.354	.524	.732	.035	.736	.945	1.260	1.496
670a	.7443	7		.283	.579	.925	1.299	.157	1.339	1.795	2.441	3.543
670b	.7557	8		.252	.500	.736	1.075	.098	1.118	1.457	1.988	2.953
985a	.7864	12		.213	.433	.610	.846	.043	.846	1.122	1.457	1.850
985b	.7557	12		.236	.457	.709	.984	.067	1.024	1.299	1.732	2.264
988a	.7142	16		.256	.488	.748	1.063	.079	1.075	1.366	1.795	2.441
988b	.7548	9		.236	.449	.658	.906	.047	.925	1.181	1.575	2.067
1027a	.7744	17		.276	.472	.709	1.004	.059	1.008	1.319	1.732	.....
1027b	.7535	14		.315	.571	.906	1.272	.098	1.319	1.713	2.343	.....
1029a	.7419	17		.217	.413	.630	.878	.039	.878	1.142	1.437	1.929

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.634	2.016	.....	.....	.....	2.559	1,085	16.540	Fine, splintering.
3.622	.....	.....	.....	.....	7.284	980	14.940	Do.
.....	.....	.....	.....	.....	3.937	705	10.750	Broke at worm-eaten knot, middle of stick. Cross-grained.
.....	.....	.....	.....	.....	.....	661	10.080	Coarse, splintering.
.....	.....	.....	.....	.....	.....	661	10.080	Long, oblique. Cross-grained.
1.850	2.598	.....	.....	.....	3.937	1,089	16.610	Fine, splintering, oblique direction. (Photograph.)
.....	.....	.....	.....	.....	3.937	980	14.940	Fine, splintering, oblique direction.
1.595	.....	.....	.....	.....	.....	945	14.410	Brittle, splintering.
.....	.....	.....	.....	.....	.....	865	13.190	Oblique. 5″ long, separating stick. Cross-grained.
.....	.....	.....	.....	.....	4.724	825	12.580	Oblique starting at corners tension and compression sides. Cross-grained.
.....	.....	.....	.....	.....	3.347	802	12.230	Oblique starting at corners tension side. Cross-grained.
2.382	.....	.....	.....	.....	3.150	985	15.020	Brittle, splintering. ″.3 deep, opening oblique cracks along grain.
2.972	.....	.....	.....	.....	3.189	888	13.540	Brittle. ″.1 deep. Oblique fracture 18″ long separating stick.
.....	.....	.....	.....	.....	3.150	865	13.190	Brittle. ″.3 deep. Oblique fractures along grain.
2.756	.....	.....	.....	.....	3.543	962	14.670	Irregular, brittle. ″.3 deep. Splintering along grain.
.....	.....	.....	.....	.....	.....	772	11.773	Irregular, brittle. ″.3 deep. Oblique fractures along grain.
.....	.....	.....	.....	.....	.....	661	10.080	Brittle. ″.3 deep. Oblique fracture 16″ long separating stick.
.....	.....	.....	.....	.....	.....	866	13.200	Irregular, brittle. ″.2 deep. Oblique crack along grain.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
629b	.6753	17		.276	.551	.866	1.220	.087	1.220	1.602	.....	.....
87a	.8796	8		.252	.512	.772	1.083	.079	1.102	1.417	1.839	2.441
151a	.8085	30		.252	.453	.689	.945	.043	.969	1.260	1.575	1.992
151b	.8912	16		.197	.378	.571	.768	.039	.783	1.043	1.319	1.693
266a	.8943	18		.752	.492	.772	1.110	.118	1.150	1.496	2.000	2.530
351a	.7614	30		.315	.610	.906	1.280	.106	1.327	1.713	.....	.....
351b	.7688	16		.256	.433	.697	.972	.067	.984	1.260	1.693	2.205
771a	.9172	30		.217	.413	.618	.827	.059	.854	1.102	1.417	.....
771b	.8958	24		.236	.472	.736	1.039	.098	1.063	.....	.....	.....
417a	.8489	18		.315	.630	.996	1.417	.157	1.457	1.890	2.598	.....
417b	.8092	17		.256	.535	.854	1.220	.106	1.256	1.634	2.264	3.307
525a	.7996	30		.433	.894	.....	.....	.....	.....	.....	.....	.....
525b	.8073	40		.374	.728	1.193	1.713	.205	1.772	.....	.....	.....
79a	.7696	18		.157	.315	.512	.669	.012	.689	.886	1.142	1.457
79a2	.7358	9		.177	.331	.496	.677	.020	.689	.886	1.130	1.496
137	.9418	15		.220	.406	.724	.846	.059	.866	1.102	1.437	1.811
143	.8368	10		.283	.567	.862	1.260	.134	1.299	1.732	.....	.....
310a	.8580	7		.189	.374	.551	.748	.039	.787	1.012	1.319	1.634

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	620	9.450	Brittle, oblique.
3.012	.....	.....	.....	.....	4.134	992	15.130	Brittle, splintering. 50 per cent. sap wood tension side.
2.658	.....	.....	.....	.....	.....	946	14.430	Brittle, splintering. ".4 deep. 10 per cent. sap wood tension side.
2.362	.....	.....	.....	.....	.....	986	15.030	Coarse, splintering. Heart.
.....	.....	.....	.....	.....	.....	858	13.080	Do.
.....	.....	.....	.....	.....	.....	638	9.730	Irregular, brittle. ".3 deep.
.....	.....	.....	.....	.....	.....	840	12.810	Coarse, splintering.
.....	.....	.....	.....	.....	2.756	760	11.590	Brittle. Cross-grained.
.....	.....	.....	.....	.....	.....	548	8.360	Do.
.....	.....	.....	.....	.....	4.331	772	11.770	Oblique, splintering. Cross-grained.
5.709	.....	.....	.....	.....	8.661	940	14.330	Took maximum deflection, starting slight fractures tension side. Drew off bearings.
.....	.....	.....	.....	.....	.....	305	4.650	Brittle. Cross-grained.
.....	.....	.....	.....	.....	.....	544	8.300	Do.
1.850	2.520	.....	.....	.....	2.520	992	15.130	Coarse, splintering.
1.909	2.520	.....	.....	.....	2.958	1,028	15.680	Do.
2.362	3.110	4.331	.....	.....	5.315	1,152	17.570	Long, coarse splintering.
.....	.....	.....	.....	.....	2.559	655	9.990	Oblique. Opened season crack at end. Cross-grained.
2.128	.....	.....	.....	.....	2.638	910	13,880	Oblique. 20" long separating stick.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
310b	.8466	13		.205	.398	.602	.850	.059	.850	1.110	1.496	1.953
432a	.7507	12		.197	.413	.610	.843	.055	.835	1.142	1.555	2.138
331a	.7455	11		.185	.335	.528	.693	.024	.705	.906	1.201	1.575
933a	.7864	20		.276	.532	.811	1.142	.130	1.169	1.583	2.205	2.882
933b	.8313	20		.264	.539	.839	1.236	.130	1.299	1.772	2.402	.....
1071	.8523	8		.236	.461	.732	1.004	.098	1.055	1.339	1.811	2.441
1072a	.8154	7		.213	.421	.669	.921	079	.929	1.213	1.595	2.150
1073	.8154	7		.252	.472	.717	1.028	.098	1.035	1.354	1.850	2.461
545a	.7898	15		.150	.295	.461	.630	.020	.630	.807	1.024	1.339
545b	.7784	16		.185	.358	.528	.709	.032	.756	.945	1.220	1.614
545c	.7972	16		.157	.315	.472	.630	.020	.634	.803	1.063	1.299
762a	.7955	20		.118	.248	.374	.492	.016	.508	.639	.827	1.032
762b	.7955	15		.110	.252	.370	.492	.020	.492	.630	.787	.984
54a	.9102	8		.252	.461	.717	1.012	1.319	1.772	2.284	3.071	.....
54b	.7182	16		.197	.354	.551	.748	.039	.768	1.024	1.358	1.772
54ca	.7443	15		.197	.354	.539	.756	.039	.748	.996	1.299	1.673
46aa	.7580	16		.181	.335	.500	.669	.024	.677	.886	1.161	1.398
846a	.8752	7		.354	.650	.965	1.378	.146	1.417	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	2.402	864	13.170	Coarse, splintering.
.....	.....	.....	.....	.....	2.874	872	13.300	Brittle. ".3 deep. Opened, oblique crack along grain. 20 per cent. sap wood compression side.
2.146	2.874	.....	.....	.....	2.874	992	15.130	Fine, splintering.
.....	.....	.....	.....	.....	4.134	860	13.110	Do.
.....	.....	.....	.....	.....	3.150	756	11.530	Irregular, brittle. ".2 deep.
3.110	.....	.....	.....	.....	4.724	990	15.100	Coarse, splintering.
2.894	.....	.....	.....	.....	3.937	968	14.760	Short, splintering. ".15 deep.
3.484	.....	.....	.....	.....	4.134	972	14.820	Coarse, splintering.
1.752	.....	.....	.....	.....	2.244	980	14.940	Oblique, splintering.
.....	.....	.....	.....	.....	2.244	815	12.430	Irregular, brittle. Knot and worm hole middle of stick. Fibers crushed.
1.693	2.205	.....	.....	.....	3.150	1,078	16.440	Splintering. Fibers crushed.
1.287	.....	.....	.....	.....	.....	960	14.640	Square, brittle. Dark seam in wood at middle of stick.
1.236	1.585	.....	.....	.....	1.585	992	15.130	Brittle, splintering. 1" deep.
.....	.....	.....	.....	.....	4.311	1,040	15.860	Fine, splintering. Drew off bearings.
2.441	.....	.....	.....	.....	3.701	940	14.330	Coarse, brittle, splintering. Crack along grain.
2.264	.....	.....	.....	.....	.....	882	13.450	Brittle, splintering. ".3 deep.
1.870	.....	.....	.....	.....	.....	974	14.850	Coarse, splintering.
.....	.....	.....	.....	.....	.....	548	8.360	Failed at knots 10" from middle.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
846*b*	.8689	9		.295	.555	.866	1.244	.130	1.264	1.634	2.323	.....
755*a*	.9199	8		.232	.453	.689	.965	.071	1.004	1.272	1.721	2.126
755*b*	.9289	11		.217	.449	.677	.945	.079	.965	1.260	1.673	2.284
524*a*	.7898	12		.197	.413	.614	.846	.043	.878	1.102	1.457	1.909
524*b*	.7710	12		.173	.343	.551	.736	.039	.748	.945	1.240	1.673
240*a*	.8432	10		.177	.354	.532	.728	.035	.752	.953	1.244	1.575
240*b*	.8687	9		.201	.410	.606	.827	.039	.850	1.087	1.457	1.949
31*a*	.7313	30		.157	.307	.449	.579	.012	.591	.748	.961	1.181
31$_1$*a*	.7528	20		.185	.335	.512	.681	.020	.697	.846	1.181	1.445
35*a*	.8352	13		.118	.228	.335	.433	.012	.457	.551	.689	.846
434*a*	.6552	12		.331	.646	1.032	1.476	.157	1.535	.....	.....	.....
925*a*	.8267	18		.118	.236	.354	.496	.024	.500	.630	.866	1.083
925*b*	.7528	16		.157	.315	.472	.630	.024	.654	.815	1.024	1.311
34*a*	.7983	20		.197	.394	.575	.803	.055	.819	1.055	1.378	1.823
34*aa*	.8949	14		.130	.252	.394	.512	.012	.524	.650	.811	.984
278*a*	.9864	18		.197	.366	.551	.748	.039	.760	.984	1.280	1.654
287*a*	.9125	18		.157	.315	.472	.642	.024	.646	.846	1.083	1.378
514*a*	.9059	16		.177	.335	.500	.661	.043	.689	.878	1.142	1.417

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	2.953	746	11.370	Brittle, vicinity of knots, middle of stick.
2.992	3.898	.....	.....	.....	5.512	1,084	16.530	Splintered at knot 4″ from middle, on corner. 40 per cent. sap wood, tension side.
2.992	5.315	.....	.....	.....	7.874	1,060	16.160	Took maximum deflection without starting fibres. Drew off bearings.
2.559	3.425	.....	.....	.....	4.724	1,050	16.010	Long, fine, splintering.
2.205	2.972	.....	.....	.....	3.740	1,076	16.410	Do.
2.055	2.874	.....	.....	.....	.....	1,000	15.250	Fine, splintering. ".3 deep, extending ".6 across face, tension side.
2.539	3.543	.....	.....	.....	4.134	1,035	15.780	Fine, splintering at corner, tension side.
1.476	1.870	2.421	.....	.....	.....	1,146	17.470	Coarse, splintering.
.....	.....	.....	.....	.....	.....	875	13.340	Brittle, splintering. ".3 deep.
1.062	1.244	1.575	2.185	.....	2.362	1,228	18.730	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	1.969	515	7.850	Square, brittle. ".7 deep.
1.358	1.732	.....	.....	.....	1.969	1,062	16.190	Irregular, brittle. 1″ deep.
1.614	.....	.....	.....	.....	2.087	988	15.070	Oblique, beginning at corner, tension side. Cross-grained.
2.284	3.001	.....	.....	.....	4.134	1,078	16.440	Fine, splintering.
1.181	1.425	1.772	2.126	2.677	3.150	1,370	20.890	Do.
2.028	2.618	3.642	.....	.....	5.315	1,215	18.530	Fine, splintering. Fibers disturbed, compression side near knot, 3″ from middle.
1.608	2.185	3.110	.....	.....	4.055	1,202	18.330	Fine, splintering.
1.772	2.205	2.819	3.661	.....	.....	1,213	18.480	Do.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			➡	In.	In.	In.	In.	In.	In.	In.	In.	In.
514b	.8754	14		.197	.362	.551	.748	.039	.756	.984	1.260	1.614
323a	.9205	10		.197	.382	.606	.787	.043	.807	1.043	1.319	1.693
323b	.9966	10		.197	.382	.602	.827	.059	.846	1.102	1.417	1.791
688a	1.0023	17		.217	.417	.630	.866	.039	.866	1.102	1.417	1.811
688b	1.0023	16		.315	.618	.913	1.272	.091	1.299	1.673	2.177	2.835
655a	1.1408	10		.276	.551	.827	1.181	.098	1.220	1.575	2.067	2.756
655b	1.0474	.....		.189	.378	.571	.807	.047	.850	.....	.....	.....
698a	.9820	{ Slow growth.		.268	.520	.815	1.142	.098	1.173	1.535	2.008	2.579
1103a	1.0023	16		.217	.433	.650	.906	.059	.921	1.161	1.508	1.909
1103b	1.0420	14		.240	.488	.760	1.063	.079	1.075	1.378	1.811	2.421
404a	1.0469	7		.134	.256	.394	.551	.008	.551	.669	.843	1.043
799a	.9127	8		.150	.276	.421	.551	.016	.571	.709	.894	1.102
799b	.9307	9		.157	.307	.453	.610	.035	.618	.787	1.012	1.260
919a	.9114	4		.157	.322	.484	.642	.020	.638	.811	1.043	1.299
919b	.8972	4		.165	.343	.492	.673	.008	.669	.866	1.118	1.378
954a	1.0113	7		.276	.520	.811	1.161	.118	1.181	1.535	2.036	2.734
954b	1.0193	7		.256	.512	.787	1.150	.122	1.181	1.602	.....	.....
649a	.8835	12		.197	.354	.532	.717	.020	.717	.906	1.102	1.396

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds of—					Maximum deflection.	Ultimate strength.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
2.028	2.520	.....	.....	.....	2.953	1,055	16.090	Coarse, splintering. Cross-grained.
2.126	2.677	3.583	.....	.....	4.134	1,158	17.660	Short, splintering. 15 per cent. heart wood, compression side.
2.343	3.661	.....	.....	.....	.....	1.025	15.630	Coarse, splintering. Failed at knot at middle.
2.205	.....	.....	.....	.....	2.441	985	15.020	Coarse, splintering. Cross-grained.
.....	.....	.....	.....	.....	.....	882	13.450	Oblique. Cross-grained.
3.563	.....	.....	.....	.....	3.937	910	13.880	Failed at knot 3″ from middle.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique, 5″ long. Broke out at center. Cross-grained.
.....	.....	.....	.....	.....	3.150	882	13.450	Oblique. Cross-grained. Sixty per cent. sap wood.
2.480	.....	.....	.....	.....	.....	840	14.330	Oblique. Cross-grained.
3.150	.....	.....	.....	.....	.....	928	14.150	Do.
1.496	1.890	.....	.....	.....	1.890	992	15.130	Tough, splintering. Fibers crushed, cross-grained.
1.339	1.713	2.185	2.894	.....	3.347	1,245	18.980	Long, fine, splintering.
1.595	1.976	2.626	.....	.....	3.150	1,140	17.380	Fine, splintering.
2.165	.....	.....	.....	.....	2.165	950	14.490	Brittle, splintering. Failed at knot, tension side.
1.693	.....	.....	.....	.....	1.969	992	15.130	Do.
.....	.....	.....	.....	.....	2.953	790	12.050	Oblique, beginning at corner. Cross-grained.
.....	.....	.....	.....	.....	2.165	610	9.300	Brittle, at knots, tension side.
1.693	2.134	2.874	4.724	.....	.....	1,231	18.770	Long, fine, splintering. Grain, curly.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
649*b*	.8989	12		.185	.335	.480	.654	.020	.654	.787	1.004	1.260
653*a*	.9386	14		.157	.315	.472	.646	.024	.650	.827	1.063	1.299
653*b*	.9204	10		.150	.287	.441	.579	.024	.591	.748	.965	1.201
654*a*	1.0264	30		.299	.602	.933	1.307	.138	1.366	1.791	2.457	.....
663*a*	.8602	16		.181	.402	.614	.858	.063	.894	1.165	1.543	2.047
663*b*	.8508	16		.197	.406	.591	.839	.059	.862	1.142	1.496	2.008
685*a*	.8676	13		.213	.453	.689	1.000	.067	1.016	1.378	1.850	.....
685*b*	.8654	24		.224	.441	.661	.917	.051	.945	1.181	1.555	2.028
7*a*	.7011	9		.098	.236	.354	.472	.004	.480	.602	.748	.913
7*b*	.6892	5		.150	.283	.421	.567	.008	.579	.709	.886	1.102
7*c*	.6364	10		.169	.335	.484	.654	.012	.661	.846	1.083	1.378
7*d*	.6500	12		.142	.291	.445	.598	.016	.602	.768	.996	1.260
45_1a	.5528	18		.197	.386	.579	.807	.028	.815	1.087	1.480	2.106
45_2a	.6159	16		.197	.382	.602	.854	.020	.815	1.063	1.378	1.811
45_2b	.5432	18		.224	.453	.669	.933	.047	.972	1.280	1.870	.....
92*a*	.6261	7		.236	.472	7.09	.965	.051	.969	1.260	1.673	.....
140*a*	.6787	11		.157	.307	.453	.606	.012	.618	.787	1.024	1.299
141*a*	.5987	12		.252	.500	.756	1.039	.051	1.051	1.378	1.850	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds in—					Maximum deflection.	Ultimate strength.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
1.496	1.831	2.323	.....	.....	2.953	1,192	18.180	Long, fine, splintering. Grain curly.
1.575	1.929	2.598	.....	.....	3.150	1,208	18.420	Coarse, oblique, splintering.
1.437	1.772	2.323	.....	.....	2.362	1,140	17.380	Long, fine, splintering.
.....	.....	.....	.....	.....	2.457	661	10.080	Oblique, 7″ long. Cross-grained.
2.953	.....	.....	.....	.....	2.953	882	13.450	Fine, splintering. Fibers crushed at knots.
.....	.....	.....	.....	.....	2.362	875	13.340	Oblique. Cross-grained.
.....	.....	.....	.....	.....	.....	715	10.900	Broke at knot, 6″ from middle. Cross-grained.
.....	.....	.....	.....	.....	2.362	825	12.580	Short, brittle, ″.15 deep, knot ″.1 diameter tension side. Grain, curly.
1.110	1.346	1.780	.....	.....	2.362	1,205	18.370	Fine, splintering. Fibers crushed.
1.378	1.780	.....	.....	.....	2.638	1,102	16.800	Coarse, splintering. Fibers crushed.
1.811	.....	.....	.....	.....	2.165	985	15.020	Fine, splintering. Fibers crushed.
1.693	2.323	.....	.....	.....	2.441	995	15.170	Coarse, long, splintering. Fibers crushed.
.....	.....	.....	.....	.....	2.165	805	12.270	Brittle, splintering .1″ deep. Fibers crushed.
.....	.....	.....	.....	.....	1.969	850	12.960	Oblique, along grain. Cross-grained.
.....	.....	.....	.....	.....	2.362	740	11.280	Brittle, splintering.
.....	.....	.....	.....	.....	1.969	740	11.280	Short, brittle, ″.1 deep. Oblique cracks along grain. Forty per cent. sap wood, tension side.
.....	.....	.....	.....	.....	1.772	865	13.190	Oblique, beginning at corners, tension side.
.....	.....	.....	.....	.....	.....	735	11.210	Short, brittle, ″.3 deep. Oblique, fractures 20″ long, nearly separating wedge-shaped piece, compression side.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
146	.7464	10		.157	.315	.492	.661	.032	.669	.870	1.114	1.398
215a	.7293	10		.142	.283	.433	.571	.012	.575	.736	.925	1.142
215b	.6763	7		.197	.374	.571	.787	.024	.787	1.032	1.358	1.811
217	.7316	7		.217	.433	.669	.945	.079	.965	1.220	1.614	2.067
218a	.7254	20		.157	.295	.433	.575	.008	.579	.728	.906	1.122
218b	.6955	18		.157	.303	.441	.606	.012	.610	.776	.984	1.209
920a	.5841	20		.224	.472	.709	1.063	.091	1.091	1.555	.....	.....
920b	.5852	20		.197	.417	.630	.945	.079	.965	1.299	1.929	.....
1043a	.7580	7		.157	.291	.433	.575	.012	.591	.748	.945	1.193
1043b	.7426	6		.157	.295	.449	.606	.012	.614	.787	1.024	1.248
931a	.8580	9		.197	.370	.551	.748	.020	.756	.984	1.260	1.575
931b	.8926	14		.189	.374	.579	.803	.047	.827	1.071	1.496	.....
752a	.7654	3		.197	.354	.551	.791	.055	.807	1.063	1.417	1.850
17a	.7102	7		.157	.315	.472	.634	.012	.646	.827	1.063	1.339
17b	.6847	10		.177	.335	.480	.650	.016	.650	.831	1.063	1.358
36a	.7284	....		.197	.374	.571	.795	.039	.803	1.071	1.378	1.791
36₁a	.7619	16		.157	.315	.472	.650	.024	.646	.815	1.063	1.280
36₂a	.7932	5		.276	.532	.843	1.220	.138	1.240	1.654	2.284	3.150

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	1.575	842	12.840	Oblique, started at knot 8″ from middle.
1.417	1.713	.....	.....	.....	.....	995	15.170	Long, oblique, beginning at corner.
.....	.....	.....	.....	.....	.....	825	12.580	Oblique, 15″ long, beginning at corner. End bearings indented opposite corners. Cross-grained.
2.677	3.622	.....	.....	.....	3.937	1,008	15.370	Coarse, splintering.
1.350	1.693	2.126	.....	.....	2.539	1,168	17.810	Splintering.
1.496	1.811	2.362	.....	.....	2.362	1,102	16.800	Fine, splintering, ".4 deep.
.....	.....	.....	.....	.....	1.969	640	9.760	Short, brittle, ".4 deep. (Photograph.)
.....	.....	.....	.....	.....	2.362	716	10.920	Splintering, brittle, .″3 deep. Fibers crushed.
1.457	1.811	2.500	.....	.....	3.150	1,205	18.370	Long, splintering, intersecting "Cooper" lines developed on three sides.
1.575	2.028	.....	.....	.....	2.559	1,102	16.800	Coarse, splintering.
1.906	2.480	2.618	.....	.....	4.134	1,178	17.960	Oblique, began at corner 4″ from middle. Forty per cent. sap wood.
.....	.....	.....	.....	.....	1.772	748	11.410	Failed at knots and worm-hole, 9″ from middle. Poor stick, dry rot.
2.461	.....	.....	.....	.....	3.543	992	15.130	Fine, splintering. Twenty per cent. sap wood, tension side.
1.654	2.224	.....	.....	.....	2.756	1,082	16.500	Splintering.
1.732	2.165	.....	.....	.....	2.165	992	15.130	Do.
2.291	.....	.....	.....	.....	2.953	980	14.940	Splintering began at corner.
1.634	2.036	2.677	.....	.....	3.701	1 195	18.220	Splintering intersecting "Cooper" lines on sides.
.....	.....	.....	.....	.....	5.315	898	13.690	Opened longitudinal crack, splitting stick from corner to corner.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
74a	.8495	6		.209	.413	.622	.890	.071	.929	1.205	1.575	2.028
74b	.8408	6		.236	.472	.728	1.016	.071	1.035	1.339	1.819	2.382
86a	.7519	11		.217	.413	.618	.854	.059	.870	1.110	1.445	1.859
244a	.5432	24		.228	.469	.709	1.024	.059	1.043	1.457	2.165	.....
244b	.5026	24		.343	.689	1.122	1.709	.197	1.732	.....	.....	.....
247a	.7102	12		.130	.260	.394	.551	.024	.551	.697	.870	1.063
247b	.7046	15		.138	.268	.394	.528	.016	.658	.807	1.008	1.248
437a	.6949	10		.169	.339	.504	.709	.039	.717	.965	1.299	1.732
628a	.6642	5		.236	.453	.681	.925	.035	.941	1.220	1.587	2.028
628b	.6841	6		.220	.417	.630	.866	.032	.870	1.122	1.417	1.839
963a	.6960	18		.291	.591	1.024	2.138	.413	2.244	3.465	.....	.....
963b	.6875	14		.366	.689	1.083	1.634	.189	1.713	2.421	.....	.....
268a	.7687	10		.197	.394	.591	.827	.047	.843	1.102	1.417	1.772
131a	.7521	3½		.138	.287	.413	.551	.020	.551	.689	.866	1.083
131b	.7421	3		.146	.276	.402	.539	.016	.551	.685	.850	1.043
245a	.6307	16		.157	.315	.472	.630	.795	1.012	1.299	1.654	.....
245b	.6767	15		.146	.276	.394	.539	.669	.835	1.035	1.299	1.713
265a	.7837	10		.126	.256	.374	.500	.016	.512	.638	.815	1.004

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
2.520	3.484	5.512	.....	.....	6.299	1,110	16.930	Splintering ".4 deep.
.....	.....	.....	.....	.....	3.071	875	13.340	Failed at knot 5" from middle. Cross-grained.
2.272	2.953	.....	.....	.....	3.543	1,054	16.070	Coarse, splintering.
.....	.....	.....	.....	.....	.....	748	11.410	Short, brittle, ".7 deep. Opened oblique fractures along grain.
.....	.....	.....	.....	.....	.....	518	7.900	Short, brittle, ".6 deep. Opened oblique fractures along grain.
1.299	1.595	1.992	.....	.....	2.756	1,208	18.420	Splintering. Fibers crushed, intersecting "Cooper" lines on three faces.
1.595	2.028	.....	.....	.....	2.835	1,186	18.080	Fine, splintering. Fibers crushed, intersecting "Cooper lines" on sides.
2.165	.....	.....	.....	.....	2.165	882	13.450	Brittle, worm-eaten.
.....	.....	.....	.....	.....	.....	818	12.470	Oblique, 8" long. Cross-grained.
.....	.....	.....	.....	.....	.....	795	12.120	Do.
.....	.....	.....	.....	.....	6.890	624	9.510	Splintering. Split along fibers 16" on compression side. Shaky.
.....	.....	.....	.....	.....	4.291	658	10.030	Split along grain. Wind shakes.
2.362	.....	.....	.....	.....	3.150	980	14,940	Short, splintering, ".2 deep.
1.299	1.595	2.126	.....	.....	2.126	1,102	16.800	Splintering, ".4 deep. Fibers crushed.
1.280	1.614	2.165	.....	.....	2.362	1,108	16.900	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	2.047	980	14.940	Short, splintering, ".4 deep.
2.362	.....	.....	.....	.....	2.362	1,102	16.800	Short, splintering. Fibers crushed.
1.201	1.516	1.890	2.579	.....	3.150	1,255	19.140	Short, splintering. Fibers crushed, "Cooper" lines developed on three faces. (Photograph.)

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
265₁a	.6933	10		.157	.315	.472	.630	.020	.630	.787	.992	1.240
548a	.7875	20		.126	.240	.354	.476	.012	.488	.606	.748	.906
548b	.7614	20		.118	.244	.366	.472	.008	.472	.591	.728	.906
342a	.6875	11		.217	.406	.606	.811	.035	.831	1.063	1.358	1.732
342b	.7193	9		.189	.362	.551	.748	.039	.748	.984	1.232	1.535
770a	.8395	11		.197	.382	.575	.795	.043	.819	1.024	1.299	1.638
770b	.8442	5		.165	.343	.512	.728	.039	.744	.953	1.228	1.535
47a	.7148	10		.126	.260	.402	.539	.012	.559	.689	.886	1.102
282a	.7671	4		.201	.394	.591	.827	.071	.866	1.142	1.516	1.949
282b	.7534	4		.213	.421	.669	.945	.083	.961	1.280	1.732	2.362
349a	.7142	4		.165	.299	.453	.610	.020	.614	.787	.972	1.220
349b	.7313	3		.157	.299	.453	.622	.024	.630	.803	1.043	1.339
264₁a	.6523	15		.177	.343	.512	.697	.028	.709	1.260	1.732	2.303
264₂a	.6170	20		.169	.323	.465	.630	.008	.650	.827	1.051	1.339
264₃a	.6159	20		.165	.335	.512	.709	.035	.720	.953	1.280	1.740
511a	.7560	9		.197	.374	.575	.803	.047	.815	1.043	1.350	1.732
511b	.7411	5		.157	.287	.429	.563	.020	.591	.748	.945	1.181
742a	.7415	8		.157	.299	.472	.661	.039	.669	.858	1.142	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.575	1.902	.....	.....	.....	2.835	1,102	16.800	Oblique, splintering. Fibers crushed.
1.102	1.346	1.575	.....	.....	.....	1,190	18.150	Long, splintering.
1.110	1.398	1.811	2.488	.....	.....	1,240	18.910	Fine, splintering. Fibers crushed, intersecting "Cooper" lines developed on three faces.
2.185	.....	.....	.....	.....	.....	932	14.210	Long, oblique. Cross-grained.
1.976	.....	.....	.....	.....	2.362	965	14.710	Oblique, 16″ long. Cross-grained.
2.028	2.606	.....	.....	.....	.....	1,048	15.980	Oblique, 8″ long. Cross-grained.
1.969	.....	.....	.....	.....	2.677	992	15.130	Oblique, 16″ long. Cross-grained.
1.898	1.732	2.087	.....	.....	2.756	1,160	17.690	Fine, splintering. Fibers crushed.
2.098	4.134	.....	.....	.....	4.134	992	15.130	Short, splintering. Fibers crushed.
3.583	.....	.....	.....	.....	5.118	925	14.100	Coarse, splintering.
1.457	1.850	.....	.....	.....	2.362	1,087	16.570	Do.
1.752	2.303	.....	.....	.....	2.756	1,055	16.090	Do.
.....	.....	.....	.....	.....	2.559	930	14.180	Short, brittle, ".3 deep.
1.756	.....	.....	.....	.....	2.559	990	15.100	Splintering. Fibers crushed.
.....	.....	.....	.....	.....	2.362	878	13.390	Irregular, brittle, ".3 deep Slight crushing.
.....	.....	.....	.....	.....	2.362	865	13.190	Coarse, brittle, splintering.
1.516	1.850	.....	.....	.....	2.559	1,100	16.770	Long, coarse, splintering.
.....	.....	.....	.....	.....	.....	758	11.560	Oblique. Cross-grained.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
742b	.8006	5		.142	.283	.406	.589	.016	.551	.689	.839	1.024
756a	.8034	4		.157	.327	.480	.669	.032	.669	.886	1.130	1.417
756b	.7980	6		.146	.315	.457	.630	.020	.630	.811	1.063	1.307
801a	.8105	17		.142	.291	.433	.571	.020	.591	.736	.925	1.161
801b	.8204	17		.157	.291	.433	.591	.024	.610	.748	.965	1.201
1171a	.7023	3		.138	.287	.433	.579	.020	.591	.756	.963	1.161
1171b	.6818	4		.173	.354	.472	.650	.020	.669	.823	1.024	1.299
1171c	.6898	4		.157	.307	.433	.579	.020	.602	.748	.945	1.201
352a	.7159	12		.276	.512	.768	1.043	.059	1.063	1.378	1.811	2.323
674a	.8717	24		.213	.398	.591	.819	.039	.827	1.063	1.378	1.744
674b	.8326	30		.205	.417	.630	.894	.047	.894	1.181	1.457	1.859
401	.7439	6		.169	.354	.532	.728	.020	.732	.961	1.240	1.575
50a	.7477	15		.154	.295	.441	.602	.020	.630	.780	.984	1.240
512a	.7693	3		.256	.492	.764	1.102	.083	1.142	1.535	2.067	2.717
512b	.7557	3		.252	.488	.756	1.063	.075	1.063	1.417	1.850	2.480
687a	.6910	16		.220	.457	.689	.965	.039	.961	1.220	1.595	2.165
687b	.7205	16		.197	.354	.535	.717	.020	.724	.925	1.161	1.457
729a	.5739	16		.198	.382	.563	.787	.016	.795	1.004	1.260	1.595

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	902	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
1.220	1.457	1.831	2.284	.....	2.559	1,255	19.140	Coarse, splintering.
1.828	2.362	.....	.....	.....	2.362	992	15.130	Oblique fractures along grain. Started at corners.
1.678	2.303	.....	.....	.....	2.953	1,044	15.920	Oblique, 12″ long. Cross-grained.
1.437	1.811	2.303	3.150	.....	3.150	1,213	18.480	Fine, splintering. Sixty per cent. sap wood, tension side.
1.476	1.839	2.303	.....	.....	3.150	1,190	18.150	Do.
1.457	1.890	.....	.....	.....	2.756	1,095	16.700	Fine, splintering. Fibers crushed.
1.65	.....	.....	.....	.....	2.165	890	13.570	Oblique, beginning at corner.
1.476	1.920	.....	.....	.....	2.559	1,046	15.950	Coarse, splintering. Fibers crushed.
2.303	.....	.....	.....	.....	3.347	984	14.240	Coarse, splintering, oblique fracture.
2.188	2.854	.....	.....	.....	3.347	1,055	16.090	Coarse, splintering.
2.284	2.874	.....	.....	.....	3.150	1,040	15.860	Coarse, splintering, ″.5 deep.
1.949	2.390	.....	.....	.....	.....	1,085	16.540	Coarse, splintering, oblique. Thirty per cent. sap wood, tension side.
1.575	1.969	2.441	.....	.....	2.953	1,208	18.420	Long, fine, splintering. Slight crushing.
.....	.....	.....	.....	.....	3.740	868	13.240	Short, splintering, ″.4 deep. Fibers crushed at small knot.
3.209	4.331	.....	.....	.....	4.331	992	15.130	Brittle, splintering, ″.5 deep. Fracture started near knot 3″ from middle.
.....	.....	.....	.....	.....	.....	795	12.120	Coarse, splintering. Failed at knot ″.2 diameter.
1.811	.....	.....	.....	.....	2.362	985	15.020	Coarse, splintering. Failed in vicinity of knot.
.....	.....	.....	.....	.....	.....	795	12.120	Oblique. Began at corner, 3″ from middle.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
729b	.5909	14		.189	.378	.575	.795	.020	.799	1.024	.....	.....
573a	.6017	7		.150	.315	.472	.688	.020	.638	.807	1.012	1.268
573b	.5960	6		.181	.362	.551	.748	.047	.756	.969	1.240	1.614
18a	.4123	13		.386	.732	1.197	.....	.....	.....	.....	.....	.....
18b	.5330	4		.217	.441	.669	.929	.028	.945	1.209	1.595	.....
18c	.4568	7		.283	.591	.925	1.299	.067	1.307	1.772	.....	.....
258a	.5050	7		.157	.331	.512	.689	.004	.693	.866	1.142	1.496
258a	.5052	11		.177	.370	.567	.768	.016	.772	.984	1.299	1.614
516a	.4989	11		.220	.433	.669	.913	.024	.945	1.240	.....	.....
9a	.7383	17		.157	.295	.457	.618	.020	.614	.787	1.024	1.269
9b	.7146	16		.157	.315	.480	.638	.008	.642	.827	1.051	1.280
44a	.6352	16		.177	.366	.551	.748	.016	.748	.984	1.240	1.614
44a	.6416	16		.185	.343	.535	.709	.020	.717	.933	1.201	1.516
119a	.7572	20		.157	.295	.433	.579	.016	.591	.748	.945	1.201
119b	.6944	20		.157	.295	.441	.579	.020	.591	.748	.965	1.181
765a	.6892	14		.197	.382	.559	.764	.028	.768	.984	1.260	1.575
765b	.6770	18		.165	.339	.520	.709	.024	.728	.929	1.181	1.535
853a	.7000	10		.157	.315	.453	.630	.020	.650	.776	.984	1.220

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	1.181	598	9.120	Fracture began at corner 7″ from middle, at knot.
1.602	.....	.....	.....	.....	2.165	972	14.820	Long, splintering. Fibers crushed.
2.441	.....	.....	.....	.....	3.150	892	13.600	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	1.575	390	5.950	Square, brittle, ″.2 deep. Oblique fractures, 20″ long, nearly separating wedge-shaped piece.
.....	.....	.....	.....	.....	1.595	662	10.090	Brittle, oblique, along grain.
.....	.....	.....	.....	.....	.....	581	8.860	Short, brittle, ″.7 deep. Oblique fracture, 4″ long, completing fracture at middle of stick.
.....	.....	.....	.....	.....	.....	844	12.870	Fine, splintering, ″.4 deep. Fibers crushed.
.....	.....	.....	.....	.....	1.969	816	12.440	Splintering, brittle at knots.
.....	.....	.....	.....	.....	.....	635	9.680	Splintering, brittle, 1″ deep.
1.437	1.772	2.185	.....	.....	3.347	1,235	18.840	Long, fine, splintering. Slight crushing.
1.654	2.126	2.953	.....	.....	3.937	1,161	17.700	Do.
2.067	.....	.....	.....	.....	2.756	966	14.730	Fine, splintering, ″.6 deep.
2.047	.....	.....	.....	.....	2.047	882	13.450	Coarse, splintering. Opened crack along grain.
1.457	1.850	2.579	.....	.....	3.150	1,208	18.420	Coarse, splintering, ″.4 deep.
1.476	1.839	2.756	.....	.....	.....	1,110	16.930	Long, fine, splintering.
2.067	.....	.....	.....	.....	2.559	963	14.680	Long, coarse, splintering.
2.028	.....	.....	.....	.....	.....	985	15.020	Long, coarse, splintering. Failed at knots tension side.
1.575	1.949	.....	.....	.....	.....	1,040	15.860	Splinters started off corner, tension side beginning opposite knot 8″ from middle Sap.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
				In.	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
853b	.7324	14		.150	.307	.457	.606	.020	.610	.787	1.004	1.220
853c	.7250	16		.138	.276	.394	.535	.016	.551	.689	.854	1.063
11a	.7784	15		.118	.236	.339	.453	.012	.472	.591	.728	.886
11b	.7614	20		.138	.260	.394	.532	.008	.539	.669	.808	1.102
877a	.8460	24		.138	.276	.410	.551	.016	.551	.709	.878	1.102
877b	.8591	20		.146	.276	.433	.571	.020	.571	.738	.921	1.152
1047a	.8068	18		.173	.331	.512	.689	.039	.709	.933	1.201	1.511
1047b	.8182	18		.169	.327	.496	.689	.039	.709	.935	1.220	1.511
46a	.7798	18		.209	.402	.598	.827	.047	.846	1.102	1.433	1.809
73a	.7707	16		.157	.299	.433	.591	.016	.591	.748	.945	1.161
73b	.7963	22		.150	.276	.394	.539	.016	.551	.697	.854	1.051
73_1	.7852	About 16		.138	.276	.413	.551	.024	.567	.732	.925	1.142
73_2	.7641	About 16		.217	.410	.618	.854	.059	.882	1.142	1.457	1.811
1038a	.7307	30		.224	.417	.669	.945	.087	.976	1.220	1.772	.....
10a	.6121	4		.236	.472	.709	1.000	.016	1.024	1.346	1.909	2.638
10b	.6167	7		.413	.764	1.205	1.811	.256	1.882	.....	.....	.....
818a	.5949	7		.220	.441	.693	1.004	.098	1.055	1.426	1.969	2.717
836	.7034	5		.157	.291	.433	.591	.020	.591	.748	.945	1.181

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.575	1.969	3.012	.....	.....	3.740	1,148	17.510	Long, fine, splintering, intersecting "Cooper" lines side of stick. Ten per cent. sap tension side.
1.280	1.654	2.224	.....	.....	3.347	1,182	18.020	Long, fine, splintering. Fibers crushed. Sap wood.
1.063	1.319	1.575	2.047	2.520	2.953	1,361	20.750	Long, fine, splintering, intersecting "Cooper" lines on one side. Sap wood.
1.339	1.693	2.362	2.953	.....	2.953	1,213	18.480	Long, fine, splintering. Sap wood.
.....	.....	.....	.....	.....	1.102	772	11.770	Failed at knot 6" from middle.
1.476	.....	.....	.....	.....	1.772	926	14.120	Coarse, splintering. Opened cracks along grain.
2.028	2.658	4.016	.....	.....	4.528	1,138	17.350	Oblique, 10" long, beginning at corner tension side at middle.
2.047	2.894	.....	.....	.....	3.150	995	15.170	Oblique fracture 10" long, beginning at corner tension side at middle.
2.382	3.150	.....	.....	.....	3.740	1,066	16.250	Short splintering ".2 deep. Sound knot at middle compression side.
1.398	1.772	2.205	2.677	.....	3.150	1,276	19.460	Long, fine splintering ".25 deep. Faint development of "Cooper" lines at middle bearing.
1.280	1.516	1.890	2.323	3.228	3.228	1,323	20.170	Long, fine splintering.
1.350	1.634	.....	.....	.....	1.969	1,102	16.800	Brittle. Opened cracks along heart. Season cracks at ends.
2.520	3.681	.....	.....	.....	.....	992	15.130	Coarse, brittle splintering. Season cracks in stick.
.....	.....	.....	.....	.....	2.362	726	11.070	Coarse splintering. Fractures began at small knots.
.....	.....	.....	.....	.....	.....	856	13.050	Long, coarse splintering. Fibres crushed.
.....	.....	.....	.....	.....	2.756	552	8.420	Failed at knot 4" from middle. Stick warped.
.....	.....	.....	.....	.....	4.134	787	12.000	Fine splintering. Fibres crushed. Knot at neutral axis at middle.
1.476	1.929	2.705	.....	.....	2.953	1,110	16.930	Long, fine splintering, intersecting "Cooper" lines on side of stick.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
722*a*	.6244	7		.173	.335	.512	.677	.020	.689	.890	1.118	1.40
722*b*	.5949	7		.157	.335	.528	.748	.039	.756	.984	1.299	1.73
990*a*	.6136	12		.185	.354	.551	.768	.039	.787	1.035	1.378	.....
990*b*	.6239	20		.157	.323	.488	.669	.020	.669	.866	1.102	1.41
1065*a*	.6921	15		.126	.256	.394	.512	.020	.528	.669	.827	1.04
1065*b*	.6653	20		.118	.244	.374	.524	.028	.524	.669	.846	1.04
1065*c*	.6614	Not well defined.		.138	.252	.394	.528	.024	.539	.669	.866	1.06
1066*a*	.6136	10		.177	.323	.496	.669	.016	.681	.854	1.083	1.37
1066*b*	.6136	10		.146	.287	.441	.591	.016	.610	.776	.984	1.26
1067*a*	.6409	10		.142	.283	.421	.563	.012	.563	.709	.906	1.16
1067*b*	.6029	12		.150	.299	.472	.650	.020	.650	.846	1.102	1.41
528*a*	.5998	12		.217	.441	.709	1.063	.114	1.079	1.476	2.126	.....
629*a*	.5906	16		.197	.394	.610	.843	.035	.850	1.150	1.595	2.36
843*a*	.7148	7		.118	.248	.366	.500	.020	.500	.638	.787	.96
843*b*	.7216	10		.122	.252	.362	.492	.016	.496	.618	.768	.96
1068*a*	.6580	18		.122	.240	.370	.488	.012	.480	.606	.756	.91
1068*b*	.6648	24		.118	.236	.354	.453	.012	.453	.571	.709	.85
	671	20		.130	.236	.343	.457	.008	.453	.551	.669	.81

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
82	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
n.	In.	In.	In.	In.	In.			
311	2.559	.....	.....	.....	.....	1,018	15.520	Irregular, brittle ".5 deep. Oblique crack 15" long separating stick. Slight crushing.
308	.....	.....	.....	.....	2.953	948	14.460	Coarse splintering oblique direction. Fibers crushed at knot 5" from middle.
...	.....	.....	.....	.....	.....	768	11.710	Oblique splintering. Cross-grained.
969	.....	.....	.....	.....	2.362	934	14.243	Long, oblique, beginning at corner tension side. Slight crushing.
299	1.693	.....	.....	.....	2.165	1,095	16.700	Long, fine splintering. Fibers crushed.
299	1.693	.....	.....	.....	2.165	1,035	15.780	Fine splintering, beginning at knot. Fibers crushed at knot.
299	1.535	2.028	.....	.....	.....	1,155	17.610	Long, fine splintering ".4 deep. Fibers crushed.
732	.....	.....	.....	.....	2.362	1,005	15.320	Coarse splintering ".5 deep. Slight crushing.
638	.....	.....	.....	.....	2.756	958	14.610	Fine splintering. Fibers crushed.
398	1.693	.....	.....	.....	2.362	1,068	16.290	Long, coarse splintering. Fibers crushed at middle bearing and at knot 1".4 from middle.
047	.....	.....	.....	.....	.....	934	14.240	Long, coarse splintering. Fibers crushed, intersecting "Cooper" lines on sides.
...	.....	.....	.....	.....	.....	695	10.600	Oblique fracture 16" long. Cross-grained.
...	.....	.....	.....	.....	2.953	822	12.530	Square, brittle. Fibers crushed.
201	1.437	1.969	.....	.....	.....	1,130	17.230	Oblique, 30" long, separating stick. Fibers crushed.
181	1.417	1.870	2.362	.....	2.362	1,213	18.500	Coarse splintering, oblique direction. Fibers crushed. End bearings indented opposite corners.
142	1.476	2.244	.....	.....	2.756	1,145	17.460	Long, fine splintering, oblique direction. Fibers crushed. End bearings indented opposite corners.
063	1.358	1.949	.....	.....	2.441	1,146	17.480	Long, fine splintering. Fibers crushed. (Photograph.)
984	1.220	1.575	2.165	.....	.....	1,242	18,940	Long, fine splintering. Fibers crushed at middle and at knot 1¼" from middle. Ten per cent. sap.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1069b	.6648	20		.118	.268	.346	.457	.012	.461	.571	.697	.854
1070a	.6710	20		.130	.248	.370	.488	.012	.488	.614	.768	.945
1070b	.6057	24		.098	.217	.327	.445	.004	.449	.571	.709	.866
136a	.5835	8		.185	.354	.524	.717	.020	.732	.925	1.181	1.535
136b	.5815	6		.157	.315	.472	.626	.028	.642	.827	1.063	1.398
841a	.6335	9		.185	.354	.551	.748	.035	.764	.984	1.280	1.772
841b	.6278	6		.157	.283	.433	.579	.024	.579	.748	.945	1.220
842a	.6347	8		.209	.425	.669	.929	.059	.965	1.260	1.772	2.421
842b	.6159	8		.185	.374	.551	.756	.020	.764	.984	1.299	1.772
4a	.7393	7		.138	.268	.394	.532	.016	.532	.689	.850	1.063
4b	.7455	9		.130	.256	.394	.512	.012	.532	.658	.819	1.024
221	.7002	18		.142	.295	.410	.524	.008	.535	.650	.776	.949
844a	.8580	16		.138	.272	.394	.535	.016	.532	.677	.866	1.063
844b	.8216	12		.122	.256	.394	.539	.016	.551	.709	.890	1.102
967a	.5000	9		.197	.374	.567	.748	.020	.768	1.004	.....	.....
967b	.5017	11		.189	.378	.575	.780	.020	.787	1.024	.....	.....
991a	.5199	14		.228	.433	.658	.886	.028	.894	1.181	1.476	1.969
991b	.5244	12		.228	.476	.748	1.063	.075	1.083	1.457	1.969	2.835

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.043	1.299	1.791	.....	.....	2.441	1,140	17.380	Fine splintering. Fibers crushed. Thirty per cent. heart wood.
1.201	1.496	.....	.....	.....	1.969	1,070	16.320	Long oblique crack beginning at corner. Fibers crushed. Sap.
1.063	1.327	1.791	.....	.....	2.638	1,205	18.370	Fine splintering. Fibers crushed. Heart.
2.146	.....	.....	.....	.....	2.953	978	14.910	Long, fine splintering one corner. Slight crushing. Sap.
2.006	.....	.....	.....	.....	2.835	918	14.000	Slight splintering. Fibers crushed. Sap.
2.598	.....	.....	.....	.....	3.150	898	13.690	Oblique splintering. Fibers crushed. Sap.
1.614	.....	.....	.....	.....	2.559	945	14.410	Fine splintering. Fibers crushed. Sap.
3.967	.....	.....	.....	.....	.....	882	13.450	Coarse splintering at corners. Fibers crushed. Sap.
.....	.....	.....	.....	.....	.....	870	13.270	Failed at knot 4½" from middle.
1.339	1.602	2.028	2.835	.....	2.953	1,213	18.480	Coarse splintering ".4 deep. Sap. (Photograph.)
1.260	1.575	2.008	.....	.....	2.480	1,205	18.370	Coarse splintering, beginning at corner.
1.122	1.358	1.721	2.362	.....	2.559	1,218	18.570	Brittle splintering ".4 deep. Fibers crushed. Ten per cent. sap wood, tension side.
1.339	.....	.....	.....	.....	1.575	980	14.940	Long oblique, beginning at knot 3½" from middle. Sap.
1.398	1.791	.....	.....	.....	2.362	1,095	16.700	Oblique cracks, beginning at corners. End bearings indented opposite corners.
.....	.....	.....	.....	.....	1.260	660	10.060	Irregular, brittle, 1½" deep. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	661	10.080	Short, brittle, ".5 deep. Oblique fracture 6" long, separating stick.
.....	.....	.....	.....	.....	.....	780	11.890	Oblique, brittle, 10" long, separating stick.
.....	.....	.....	.....	.....	.....	772	11.760	Square, brittle, ".4 deep. Oblique fracture 16" long, separating stick. Piece 10" long detached tension side.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1025a	.4789	8		.146	.299	.453	.591	.004	.618	.787	.992	1.29
1025b	.5084	7		.157	.287	.433	.579	0	.583	.728	.925	1.18
717a	.4546	14		.283	.575	.906	1.339	.138	1.378	.....	.....	.....
717b	.4886	14		.264	.512	.803	1.181	.118	1.220	1.732	.....	.....
979a	.4466	5		.213	.406	.618	.858	.035	.866	1.189	.....	.....
979b	.4375	2		.217	.421	.650	.874	.039	.906	1.205	1.969	.....
635a	.4857	9		.213	.406	.610	.811	.020	.835	1.063	1.406	.....
694a	.4170	2½		.244	.512	.772	1.114	.051	1.142	1.535	.....	.....
694b	.4049	About 3		.244	.488	.748	1.075	.059	1.102	1.524	.....	.....
362	.5005	10		.165	.354	.551	.772	.032	.772	1.024	1.378	.....
855a	.5329	6		.472	.984	1.732	.....	.....	.....	.....	.....	.....
908a	.4674	4		.315	.748	1.417	2.539	.638	2.874	.....	.....	.....
908b	.4676	4		.394	.807	1.417	2.284	.433	2.480	.....	.....	.....
911a	.4670	5		.346	.748	1.280	2.165	.453	2.244	3.583	.....	.....
690a	.5341	3		.402	.787	1.228	1.811	.197	1.870	2.520	4.331	.....
690b	.5284	4		.378	.787	1.260	1.811	.189	1.909	.....	.....	.....
640a	.4705	7		.354	.732	1.220	1.811	.197	1.890	.....	.....	.....
981a	.4375	11		.165	.354	.559	.827	.047	.846	1.161	1.772	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	1.772	847	12.910	Long, fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	852	12.990	Long, oblique, beginning at corner, 6″ from end. Fibers crushed.
.....	.....	.....	.....	.....	.....	534	8.140	Oblique, splintering, beginning at corner.
.....	.....	.....	.....	.....	.....	660	10.060	Square, brittle, 1″.4 deep. Fibers crushed.
.....	.....	.....	.....	.....	.....	658	10.080	Irregular, brittle, 1″ deep. Fibers crushed.
.....	.....	.....	.....	.....	2.165	661	10.080	Brittle, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	695	10.600	Oblique, ″.6 deep. Fibers crushed. End-bearings indented opposite corners.
.....	.....	.....	.....	.....	2.362	655	9.990	Long, fine, splintering, one corner. Short, brittle, other corner. Fibers crushed.
.....	.....	.....	.....	.....	2.362	638	9.730	Long, splintering. Fibers crushed.
.....	.....	.....	.....	.....	1.772	772	11.770	Long, coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	398	6.070	Oblique, 10″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	480	7.320	Fibers fractured, one corner. Split along grain. One end-bearing indented on corner. Fibers crushed.
.....	.....	.....	.....	.....	.....	498	7.590	Oblique, beginning 9″ from middle.
.....	.....	.....	.....	.....	.....	574	8.750	Fracture started tension side. Fibers crushed.
.....	.....	.....	.....	.....	5.315	690	10.520	Splintering, brittle, ″.5 deep. Slight crushing.
.....	.....	.....	.....	.....	.....	520	7.980	Cross-grained fragment 24″ long flew off tension side.
.....	.....	.....	.....	.....	.....	550	8.390	Oblique fracture, 16″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	661	10.080	Long, fine, splintering, ″.25 deep, one corner. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
981b	.4614	11		.197	.374	.563	.768	.020	.787	1.024	1.417	.....
889a	.4498	5		.583	1.260	2.244	4.921	1.280	.....	.....	.....	.....
721a	.5057	14		.157	.354	.551	.748	.043	.787	1.043	1.437	.....
972a	.5718	11		.150	.284	.413	.559	.020	.579	.720	.945	1.246
972b	.5278	14		.157	.335	.492	.661	.012	.677	.866	1.102	1.378
669a	.5760	6		.209	.433	.654	.965	.059	.984	1.299	1.811	.....
1177a	.4305	3		.323	.638	1.008	1.465	.118	1.535	.....	.....	.....
1177b	.4491	2		.276	.472	.709	.957	.047	.984	1.299	.....	.....
272a	.3955	18		.260	.492	.760	1.091	.094	1.130	.....	.....	.....
272b	.3885	.....		.295	.591	.913	1.299	.150	1.465	.....	.....	.....
1035a	.4580	7		.197	.421	.669	.945	.059	.965	1.260	1.969	.....
1035b	.4828	7		.217	.421	.669	.984	.114	1.024	1.378	1.890	2.81
847a	.4442	6		.197	.386	.591	.843	.059	.866	1.181	.....	.....
847b	.4386	6		.213	.413	.610	.854	.039	.866	1.130	1.614	.....
522	.4155	.....		.260	.532	.843	1.209	.130	1.260	1.850	.....	.....
961a	.4080	6		.224	.457	.685	.984	.051	1.032	.....	.....	.....
961b	.4034	6		.217	.441	.693	1.004	.067	1.032	.....	.....	.....
1054a	.4085	5		.260	.551	.882	1.346	.161	1.409	2.047	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
						698	10.640	Coarse, splintering. Fibers crushed.
					6.378	441	6.720	Brittle, ".5 deep. Oblique fracture 8" long, Fibers crushed. (Photograph.)
						760	11.590	Fine, splintering and square, brittle. Fibers crushed.
					2.165	874	13.330	Fine, splintering. Fibers crushed. Knot 1½" from middle.
						835	12.730	Long, fine, splintering. Fibers crushed.
					2.756	765	11.660	Fine, splintering, one corner. Fibers crushed.
						542	8.260	Fine, splintering. Fibers crushed. Knot ".3 diameter at middle.
						660	10.060	Brittle corner at middle. Splinter started off 8" from middle at one corner. Fibers crushed.
					1.378	528	8.050	Oblique, splintering. Slight crushing.
						510	7.780	Square, brittle, ".7 deep. Oblique fracture 6" long, completing the break. Knot ".6 diameter 3" from middle.
					2.559	676	10.310	Splintering, one corner. Fibers crushed.
					3.740	829	12.640	Long, fine, splintering. Fibers crushed.
					1.575	655	9.990	Oblique, splintering at one corner. Slight crushing.
					2.087	704	10.730	Fine, splintering and brittle, 1" deep. Fibers crushed.
					2.756	605	9.226	Long, splintering at one corner. Fibers crushed.
						540	8.230	Square, brittle break across stick.
						495	7.550	Do.
					3.032	568	8.970	Irregular, brittle, ".3 deep. Fibers crushed

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
1054b	.4506	5		.256	.504	.827	1.370	.232	1.417	2.441	.....	.....
552a	.4488	7		.394	.839	1.386	.....	.....	.....	.....	.....	.....
1012a	.3750	16		.181	.366	.551	.819	.039	.819	1.118	.....	.....
1012b	.3898	.....		.177	.362	.551	.772	.035	.787	1.063	.....	.....
1028a	.4108	6		.157	.315	.472	.709	.043	.693	.945	.....	.....
1028b	.4108	.....		.165	.339	.496	.693	.020	.693	.984	.....	.....
255a	.3552	.....		.287	.575	.906	1.319	.....	.....	.....	.....	.....
304a	.3824	3		.217	.449	.677	.953	.055	.996	1.307	.....	.....
304b	.3477	3		.256	.532	.827	1.181	.102	1.209	1.634	.....	.....
309a	.5136	.....		.169	.335	.524	.740	.043	.752	1.024	1.386	2.028
309b	.4858	.....		.228	.457	.799	1.008	.118	1.043	1.417	1.909	.....
754a	.5001	12		.157	.295	.472	.630	.016	.630	.815	1.016	1.298
754b	.4909	7		.157	.315	.492	.661	.012	.669	.846	1.083	1.398
754c	.4925	.....		.157	.323	.504	.677	.024	.689	.882	1.142	1.535
659a	.4977	5		.189	.378	.583	.843	.067	.858	.....	.....	.....
659b	.5000	10		.177	.354	.551	.764	.035	.764	.996	1.311	.....
646a	.5078	.....		.295	.579	.866	1.276	.094	1.299	1.693	2.461	.....
646b	.5023	.....		.287	.567	.906	1.283	.098	1.339	1.850	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds of—					Maximum deflection.	Ultimate strength.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
					3.347	558	8.510	Square, brittle, ".3 deep. Fibers crushed.
					1.575	377	5.750	Oblique, 10" long, beginning at knot 2½" from middle. Cross-grained.
						642	9.790	Brittle and splintering, 1½" deep. Fibers crushed.
						600	9.150	Fine, splintering. Fibers crushed.
					1.772	652	9.940	Do.
						606	9.240	Fine, splintering, 7" deep. Fibers crushed.
						516	7.869	Square, brittle, ".5 deep. Fibers crushed.
						622	9.480	Do.
						568	8.660	Square break clear across stick.
					3.150	840	12.810	Fine, splintering, 5" deep. Fibers crushed.
						714	10.890	Brittle, splintering. Oblique crack 22" long separating stick. Fibers crushed.
					1.969	849	12.950	Fine, splintering. Fibers crushed.
					1.890	881	13.430	Brittle, ".2 deep. Oblique split along grain 16" long. Fibers crushed.
					1.969	800	12.200	Oblique along grain, beginning at corner 9" from middle.
					1.181	550	8.390	Broke at knots. Cross-grained.
					1.693	765	11.660	Do.
						690	10.520	Crack 9" long, nearly separating stick. Cross-grained, brittle.
					2.559	647	9.860	Short, brittle, 7" deep. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
906a	.4867	4		.213	.385	.528	.748	.051	.768	1.004	1.362	.....
906b	.4451	8		.197	.410	.646	.906	.059	.913	1.220	1.673	.....
912	.4499	3½		.220	.461	.724	1.051	.063	1.071	.....	.....	.....
912	.5107	6		.252	.484	.787	1.220	.217	1.197	1.713	.....	.....
634a	.3748	20		.276	.512	.815	1.102	.047	1.142	1.622	.....	.....
634b	.3979	20		.236	.472	.709	.984	.024	1.004	1.280	1.772	.....
662a	.4818	18		.220	.429	.650	.886	.020	.906	1.142	1.398	.....
662b	.4969	20		.220	.433	.650	.866	.028	.886	1.142	.....	.....
662c	.4869	20		.232	.433	.654	.866	.016	.886	1.122	.....	.....
879a	.3025	20		.394	.748	1.181	.....	.....	.....	.....	.....	.....
879b	.2908	20		.433	.850	1.362	.....	.....	.....	.....	.....	.....
782	.3580	30		.370	.709	1.102	1.524	.079	1.602	.....	.....	.....
783a	.3440	33		.295	.630	.945	1.319	.047	1.362	.....	.....	.....
783b	.3413	30		.307	.501	.913	.....	.....	.....	.....	.....	.....
790a	.3216	22		.327	.630	.965	1.398	.079	1.457	.....	.....	.....
790b	.3336	28		.315	.661	1.024	1.425	.063	1.465	.....	.....	.....
792a	.2713	12		.579	1.142	1.968	.....	.....	.....	.....	.....	.....
792b	.2612	10		.689	1.307	.....	.....	.....	.....	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
						748	11.410	Brittle, ".5 deep. Fibers crushed.
						662	10.090	Brittle, ".5 deep. Opened crack along grain 24". Fibers crushed.
					1.878	545	8.310	Brittle, splintering. Broke at knot at middle.
					2.559	603	9.200	Coarse, splintering. Fibers crushed.
						583	8.890	Square, brittle, across stick at middle. Opened crack along grain 10".
					1.772	661	10.080	Do.
						736	11.220	Oblique 18" long. Cross-grained.
						616	9.930	Do.
						616	9.390	Do.
					1.693	428	6.530	Short, brittle. Opened cracks along grain. Knot 1" from middle. Ten per cent. sap-wood tension side.
					2.559	414	6,310	Square, brittle, 1".3 deep. Opened cracks along grain Knot ¾" from middle. Ten per cent. sap-wood.
						512	7.808	Square, brittle, ".7 deep at knot 1¼" from middle. Oblique fracture 4" long separating stick.
						495	7.550	Irregular, brittle, at middle separating stick. Small knot 2½" from middle.
						420	6.400	Failed at knot 3" from middle.
						550	8.390	Short, brittle, across stick at middle. Opened crack along neutral axis 8".
						552	8.420	Square, brittle, across stick at middle. Opened crack along neutral axis 12".
						371	5.660	Square, brittle, across stick at middle.
						331	5.050	Square, brittle, separating stick at middle. Oblique fracture along grain from middle to end.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	77
			→	In.	In.	In.	In.	In.	In.	In.	In.	In
792c	.2804	16		.717	1.476	2.480	.....	.....	.....	.....	.....	.....
874a	.3834	30		.252	.492	.768	1.083	.063	1.130	.....	.....	.....
874b	.3902	28		.287	.528	.807	1.122	.055	1.142	1.535	.....	.....
1099a	.3560	22		.354	.689	1.063	1.496	.094	1.595	.....	.....	.....
1099b	.4121	20		.374	.709	1.122	1.535	.083	1.606	2.165	.....	.....
1017a	.4313	28		.157	.335	.512	.701	.016	.709	.906	1.181	.....
1017b	.4256	24		.197	.374	.551	.748	.020	.748	.945	1.220	.....
1021a	.3623	16		.220	.413	.610	.854	.032	.874	1.220	.....	.....
1021b	.3783	16		.189	.374	.571	.787	.032	.787	1.051	1.457	.....
850a	.3626	3		.709	1.496	.....	.....	.....	.....	.....	.....	.....
850b	.3154	3		.563	1.150	1.988	.....	.....	.....	.....	.....	.....
850a	.3625	14		.386	.787	1.280	1.870	.205	1.976	.....	.....	.....
850b	.3602	20		.453	.925	1.417	2.126	.220	2.165	.....	.....	.....
851a	.3523	20		.433	.866	1.307	.....	.....	.....	.....	.....	.....
851b	.3406	20		.370	.748	1.165	1.811	.205	1.949	.....	.....	.....
852	.3324	12		.496	1.024	1.496	2.480	.323	.....	.....	.....	.....
969a	.5697	30		.236	.472	.709	.972	.039	.965	1.240	1.614	2.
969b	.4229	22		.217	.394	.591	.827	.039	.835	1.161	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds of—				Maximum deflection.	Ultimate strength.		Description of fracture.
992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*			
					382	5.060	Square, brittle at middle. Split along grain 8″.
					551	8.400	Square, brittle at middle. Split along grain 4″.
					625	9.530	Brittle, splintering, separating stick at middle. Opened cracks along grain 16″.
					551	8.400	Square, brittle at middle. Cracks along grain 12″.
					614	9.360	Square, brittle at middle. Cracks along grain 30″,
					770	11.740	Brittle, splintering along grain. Fibers crushed.
					771	11.760	Fine, splintering. Square, brittle, compression side at middle.
					598	9.120	Long, splintering. Fibers crushed.
					680	10.370	Long, splintering. Fibers crushed. Split along grain 30″.
					303	4.700	Square, brittle, ″.5 deep. Oblique fractures, detached piece 12″ long, compression side.
					358	5.460	Square, brittle across stick at middle.
					455	6.940	Oblique, 9″ long. Cross-grained, 16 knots, ″.1 diameter.
					519	7.910	Brittle at middle. Split along grain 18″. Knot at neutral axis opposite middle bearing.
					441	6.720	Long, oblique, beginning opposite middle bearing.
					479	7.300	Square, brittle at middle. Split along grain 16″.
					441	6.720	Irregular, brittle, separating stick at middle.
					800	12.200	Irregular, brittle at middle. Opened crack along grain 24″.
					655	9.990	Irregular, brittle at middle.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	7
			⟹	In.	In.	In.	In.	In.	In.	In.	In.	I
983a	.5267	30		.157	.315	.472	.630	.016	.630	.787	1.004	1.
983b	.5114	30		.173	.323	.492	.669	.020	.669	.846	1.102	1.
984a	.5074	30		.165	.335	.492	.677	.016	.669	.866	1.122	1.
984b	.4913	16		.177	.343	.532	.698	.008	.709	.886	1.142	1.
984c	.5267	30		.146	.315	.453	.606	0	.591	.748	.945	1.
1000a	.5078	28		.236	.457	.689	.953	.039	.961	1.240	.....	..
1000b	.5159	30		.252	.532	.....	.....	.....	.....	.....	.....	..
701a	.5289	8		.213	.413	.614	.850	.024	.882	1.142	1.457	.
707a	.4682	14		.157	.315	.472	.646	.016	.650	.827	1.102	.
707b	.5335	16		.118	.256	.378	.500	.008	.512	.630	.787	
675a	.6307	16		.197	.362	.532	.709	.039	.709	.886	1.102	
675b	.6512	18		.177	.354	.532	.693	.012	.709	.886	1.063	
691a	.5679	....		.425	.843	1.378	1.929	.197	1.929	.....	.....	.
691b	.5563	....		.374	.709	1.095	1.575	.184	1.642	2.284	.....	.
1100a	.4834	6		.315	.650	1.004	1.378	.059	1.406	1.827	.....	.
1100b	.5078	6		.421	.945	.....	.....	.....	.....	.....	.....	.
1102a	.7347	20		.256	.524	.807	1.102	.024	.....	.....	.....	.
692a	.5630	30		.315	.610	.945	1.280	.039	1.276	1.673	2.165	.

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.	In.			
1.054	.....	.....	.....	.....	.....	958	14.610	Irregular, brittle. Fibers crushed. Opened crack along grain 22″.
.....	.....	.....	.....	.....	.....	876	13.360	Irregular, brittle. Fibers crushed. Opened crack along grain 18″.
.....	.....	.....	.....	.....	1.390	820	12.500	Short, brittle, ″.4 deep. Fibers crushed. Long oblique fracture 22″ long, nearly separating stick.
2.067	.....	.....	.....	.....	2.067	882	13.450	Coarse, splintering at one corner. Short, brittle, 1″ deep, other corner. Fibers crushed. Opened cracks along grain.
.....	.....	.....	.....	.....	.....	875	13.340	Long, oblique, beginning at corner, 8″ from middle. Fibers crushed. One end bearing indented corner.
.....	.....	.....	.....	.....	.....	658	10.080	Brittle, oblique. Fibers crushed. Knot 3″ from middle.
.....	.....	.....	.....	.....	.....	265	4.040	Oblique, 18″ long, separating stick. Cross-grained.
.....	.....	.....	.....	.....	.....	771	11.760	Oblique, brittle at middle. Oblique fractures, beginning at tension side, 22″ long. (Photograph.)
.....	.....	.....	.....	.....	.....	770	11.740	Square, brittle, ″.6 deep. Fibers crushed. Oblique fracture 18″ long, separating stick.
1.260	.....	.....	.....	.....	.....	968	14.760	Long, splintering in oblique direction. Fibers crushed. End bearings indented opposite corners. (Photograph.)
1.575	.....	.....	.....	.....	.....	978	14.910	Brittle and splintering. Fibers crushed. Opened cracks along grain 30″.
1.054	.....	.....	.....	.....	.....	990	15.100	Square, brittle, ″.4 deep. Fibers crushed. Splintered along grain at neutral axis.
.....	.....	.....	.....	.....	.....	490	7.470	Square, brittle, ″.4 deep. Oblique fractures separating stick into 4 pieces. Cross-grained. Stick badly warped.
.....	.....	.....	.....	.....	.....	620	9.450	Square, brittle, ″.4 deep, 1″ from middle. Oblique fractures along grain, splitting stick into 5 pieces. (Photograph.)
.....	.....	.....	.....	.....	.....	598	9.120	Oblique, 20″ long, beginning at corner, 20″ from middle. Cross-grained.
.....	.....	.....	.....	.....	.....	322	4.910	Oblique, beginning at corner, ″.7 from middle.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique, 16″ long. Cross-grained.
.....	.....	.....	.....	.....	.....	786	11.220	Square, brittle, ″.6 deep. Oblique fractures, separating stick into 5 pieces.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
692b	.5419	28		.323	.646	.984	1.339	.043	1.339	1.732	2.308	.....
14a	.5315	20		.378	.768	1.142	1.598	.075	1.575	2.047	.....	.....
14b	.5802	20		.374	.748	1.142	1.575	.079	1.595	2.087	2.756	.....
327a	.5857	7		.323	.630	.984	1.307	.047	1.319	1.693	2.205	2.894
327b	.5239	8		.315	.610	.945	1.220	.032	1.260	.....	.....	.....
734a	.5723	9		.244	.468	.717	.965	.028	.965	1.248	1.516	1.968
734	.5854	6		.236	.453	.669	.906	.016	.906	1.142	1.406	1.791
800a	.5556	22		.244	.492	.736	1.043	.043	1.051	1.378	1.713	.....
800b	.5385	20		.213	.433	.650	.854	.012	.866	1.110	1.378	.....
924	.4997	20		.217	.433	.634	.846	.008	.858	1.091	1.358	1.713
1249a	.7873	80		.327	.559	.843	1.102	.032	1.142	1.366	1.909	.....
1250a	.6029	20		.433	.811	1.220	.....	.....	.....	.....	.....	.....
1251	.5672	21		.394	.709	1.024	1.339	.059	.....	.....	.....	.....
1252	.6398	About 45		.268	.551	.846	1.130	.051	1.181	1.437	1.780	2.264
1253a	.6671	About 40		.331	.646	1.008	1.457	.161	1.535	.....	.....	.....
1254	.5807	About 45		.343	.688	1.024	1.417	.094	1.457	1.890	2.508	.....
535a	.4907	24		.165	.343	.508	.689	.020	.717	.965	.....	.....
535b	.4923	26		.173	.331	.512	.705	.024	.717	.945	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
[illegible]	902	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	695	10. 600	Square, brittle, ".6 deep. Oblique fractures, separating stick into 6 pieces. (Photograph.)
.....	.....	.....	.....	.....	.....	660	10. 060	Coarse, splintering. Split along grain 28".
.....	.....	.....	.....	.....	.....	696	10. 640	Oblique, splintering. Split along grain 22".
.....	.....	.....	.....	.....	.....	800	12. 200	Square, brittle, ".7 deep. Oblique fractures along grain, separating stick into 5 pieces.
.....	.....	.....	.....	.....	.....	528	8. 050	Oblique, splintering along grain.
2. 342	.....	.....	.....	.....	.....	990	15. 100	Square, brittle, ".6 deep. Splintered along grain 32".
2. 146	.....	.....	.....	.....	.....	969	14. 780	Short, splintering at middle. Split along neutral axis from end to end.
.....	.....	.....	.....	.....	.....	710	10. 890	Short, brittle at middle. Knot, ".3 diameter at middle.
.....	.....	.....	.....	.....	.....	756	11. 560	Short, brittle, ".3 deep. Oblique fracture 12" long, separating stick. (Photograph.)
.....	.....	.....	.....	.....	.....	836	12. 750	Irregular, brittle across stick at middle. Split along neutral axis from middle to end.
.....	.....	.....	.....	.....	.....	705	10. 750	Coarse, splintering. Knots near middle. Green wood.
.....	.....	.....	.....	.....	.....	370	5. 640	Oblique, 8" long, separating stick. Cross-grained.
.....	.....	.....	.....	.....	.....	441	6. 720	Irregular, brittle. Separated into 4 pieces.
.....	.....	.....	.....	.....	.....	840	12. 810	Stick broke into 5 pieces. Cross-grained.
.....	.....	.....	.....	.....	.....	490	7. 470	Brittle. Split along grain.
.....	.....	.....	.....	.....	.....	661	10. 080	Brittle, splintering. Split along grain.
.....	.....	.....	.....	.....	.....	635	9. 660	Square, brittle, spreading stick at middle.
.....	.....	.....	.....	.....	1. 668	625	9. 590	Coarse, splintering. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	7
			→	In.	In.	In.	In.	In.	In.	In.	In.	I
741a	.4167	4		.213	.425	.658	.925	.039	.965	1.299	.....	...
741b	.4334	4		.205	.410	.630	.898	.043	.906	1.213	.....	...
657a	.3426	20		.323	.646	.964	1.339	.047	1.378	.....	.....	...
657b	.3506	20		.453	.866	1.339	1.929	.142	.....	.....	.....	...
666	.2687	30		.535	1.220	2.126	.....	.....	.....	.....	.....	...
673a	.4103	.....		.335	.689	1.063	1.496	.079	1.516	2.067	.....	...
673b	.4211	18		.244	.512	.748	1.032	.020	1.043	1.358	.....	...
710	.4443	24		.276	.551	.835	1.161	.039	1.181	1.535	.....	...
711a	.4525	16		.256	.512	.764	1.024	.020	1.039	1.319	.....	...
711b	.4419	16		.354	.689	1.047	1.429	.067	1.457	.....	.....	...
712a	.3239	6		.354	.677	1.047	.....	.....	.....	.....	.....	...
712b	.3239	7		.295	.591	.882	1.260	.059	1.319	.....	.....	...
713a	.3841	18		.236	.453	.677	.925	.028	.945	.....	.....	...
713b	.3648	30		.256	.543	.787	1.091	.039	1.118	1.496	.....	...
714a	.5289	18		.256	.512	.787	1.047	.024	1.063	1.339	1.969	...
714b	.5243	18		.295	.579	.866	1.161	.035	1.181	1.496	1.890	...
715a	.5533	8		.295	.630	.....	.....	.....	.....	.....	.....	...
978a	.6743	8		.236	.453	.701	.945	.035	.945	1.240	1.496	1

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds of—				Maximum deflection.	Ultimate strength.		Description of fracture.
1102	1213	1328			Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.			
					647	9.860	Short, brittle, ".4 deep. Fibers crushed. Split along grain 25".
					658	10.030	Coarse, splintering. Fibers crushed.
					480	7.300	Long, oblique, separating stick into 3 pieces.
					441	6.720	Square, brittle, across stick at middle.
					378	5.760	Square, brittle, ".7 deep. Oblique, brittle fracture separating stick. Split along grain 25".
					600	9.150	Square, brittle, across stick at middle. Split along neutral axis from end to end.
					661	10.080	Square, brittle, across stick at middle.
					614	9.360	Square, brittle, across stick at middle. Split along neutral axis 13".
					546	8.320	Square, brittle, across stick at middle. Long, splintering crack along grain.
					550	8.390	Square, brittle, ".6 deep. Short, oblique fracture, separating stick.
					370	5.640	Oblique, along grain. Piece 12" long detached tension side between middle and end bearing.
					551	8.400	Square, brittle, at middle. (Photograph.)
					525	8.000	Long, oblique.
					595	9.070	Square, brittle, at middle.
					690	10.520	Oblique, brittle, 6" long, separating stick at middle. Fractures along grain separating ends.
					756	11.530	Short, brittle, at middle, separating stick. Fractures along grain separating ends.
					278	4.240	Short, brittle, 1" deep.
2.235	2.953				1,061	16.480	Coarse, splintering at middle. Oblique fractures 19" long separating stick.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
978b	.7110	8		.276	.571	.846	1.169	.067	1.181	1.535	1.929	2.42
62a	.5998	10		.295	.591	.886	1.220	.094	1.220	1.614	2.047	2.61
277a	.4698	18		.220	.417	.650	.878	.016	.886	1.130	1.398	1.8
277b	.4690	18		.205	.421	.630	.890	.020	.874	1.122	1.398	1.8
651a	.5063	16		.472	.894	1.358	1.988	.....	.....	.....	.....	.....
651b	.5135	12		.433	.866	1.299	1.831	.122	1.949	2.677	.....	.....
1b	.4091	8		.269	.413	.646	.898	.020	.913	1.220	.....	.....
222a	.6204	8		.335	.650	.984	1.350	.091	1.378	1.831	2.441	.....
777	.3982	10		.177	.370	.551	.787	.039	.803	1.142	.....	.....
777	.3671	16		.295	.602	.890	.....	.....	.....	.....	.....	.....
788a	.4022	18		.177	.362	.559	.780	.024	.827	1.142	.....	.....
788b	.4069	20		.185	.370	.583	.807	.012	.827	1.102	.....	.....
789a	.3698	16		.252	.512	.815	1.181	.079	1.220	.....	.....	.....
789b	.3671	18		.248	.512	.787	1.272	.142	1.319	.....	.....	.....
797a	.4092	20		.197	.394	.606	.850	.039	.858	1.181	.....	.....
797b	.3989	18		.228	.458	.701	.992	.051	.992	1.417	.....	.....
1044a	.3710	5		.284	.551	.882	.....	.....	.....	.....	.....	.....
1044b	.4550	7		.220	.433	.669	.945	.051	.969	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
3.307	.....	.....	.....	.....	.....	950	14.490	Oblique, brittle. Oblique fracture 10″ long separating stick.
3.642	.....	.....	.....	.....	.....	888	13.510	Square, brittle, ".7 deep. Split along grain 30″.
.....	.....	.....	.....	.....	.....	793	12.090	Square brittle, ".6 deep. Oblique fracture 12″ long separating stick.
.....	.....	.....	.....	.....	.....	820	12.500	Square, brittle, ".5 deep. Split along grain 24″.
.....	.....	.....	.....	.....	.....	441	6.720	Brittle. Broke at knot near middle. Cross-grained.
.....	.....	.....	.....	.....	.....	658	10.030	Square, brittle, ".7 deep. Oblique fractures detached a piece 9″ long; also broke square across at knot. (Photograph.)
.....	.....	.....	.....	.....	.....	642	9.790	Coarse, brittle. Fibers crushed. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	756	11.530	Square, brittle, ".5 deep. Oblique fractures 8″ long nearly detaching wedge-shaped piece compression side, pieces 6″ long detached tension side.
.....	.....	.....	.....	.....	.....	598	9.120	Failed at knot 3½″ from middle. Fibers crushed at the knot and middle bearing. (Photograph.)
.....	.....	.....	.....	.....	.....	398	6.070	Oblique, 4″ long, separating stick. Stick contains 7 knots from ¼″ to ¾″ diameter. Cross-grained.
.....	.....	.....	.....	.....	.....	616	9.390	Short, brittle. Fibers crushed.
.....	.....	.....	.....	.....	.....	647	9.870	Short, brittle. Fibers crushed. Split along grain 16″.
.....	.....	.....	.....	.....	.....	536	8.170	Square, brittle, across middle of stick. (Photograph.)
.....	.....	.....	.....	.....	.....	495	7.550	Square, brittle, across middle of stick.
.....	.....	.....	.....	.....	.....	604	9.210	Brittle, oblique, at middle. Opened crack along grain 12″.
.....	.....	.....	.....	.....	.....	584	8.900	Short, oblique at middle.
.....	.....	.....	.....	.....	.....	368	5.610	Oblique, 8″ long, beginning at knot 10″ from middle. Cross-grained. Defective stick.
.....	.....	.....	.....	.....	.....	551	8.400	Short, brittle, and oblique splintering. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	77
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In*
975*a*	.4324	12		.165	.328	.492	.673	.028	.689	.945	.....	...
987*a*	.3682	12		.256	.520	.795	1.264	.150	1.346	.....	.....	...
987*b*	.3699	18		.201	.417	.638	.925	.051	.945	1.378	.....	...
638*a*	.4301	20		.217	.433	.669	.900	.024	.906	1.189	.....	...
668*a*	.3927	10		.260	.520	.799	1.142	.043	1.142	.....	.....	...
668*b*	.3971	9		.236	.472	.717	1.024	.039	1.024	1.378	.....	...
730*a*	.3364	10		.252	.488	.736	1.102	.094	1.161	.....	.....	...
730*b*	.3307	13		.260	.520	.811	1.260	.118	1.291	.....	.....	...
819*a*	.4602	20		.256	.488	.744	1.024	.039	1.063	1.378	.....	...
819*b*	.4642	20		.295	.551	.850	1.220	.079	1.236	1.819	.....	...
819*c*	.4733	20		.244	.461	.689	.945	.032	.953	1.260	1.693	...
813*a*	.4665	14		.504	1.008	1.634	.....	.....	.....	.....	.....	...
992*a*	.5067	16		.520	1.102	1.811	.....	.....	.....	.....	.....	...
992*b*	.4588	28		.283	.571	.886	1.220	.047	1.260	1.654	.....	...
661*a*	.5262	16		.236	.453	.689	.953	.039	.984	1.260	.....	...
661*b*	.5892	18		.205	.394	.591	.787	.032	.795	1.008	1.229	1.4
656*a*	.6862	20		.492	1.102	.....	.....	.....	.....	.....	.....	...
656*b*	.6343	9		.433	.945	1.465	2.165	.276	2.331	.....	.....	...

TABLE 1.—TRANSVERSE TESTS—Continued.

Deflections for loads in pounds of—					Maximum deflection.	Ultimate strength.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
						644	9.820	Splintering. Fibers crushed. Deflections probably increased by saw-cut ¼" from end bearing. (Photograph.)
						196	7.560	Square, brittle, at middle.
						579	8.830	Square, brittle, at middle. Cracked 16" along grain.
						647	9.860	Square, brittle, .4 deep. Oblique crack 8" long separating stick. Fibers crushed.
						543	8.280	Brittle, .4 deep. Oblique fracture 8" long separating stick. Cross-grained.
						617	9.410	Square, brittle, at middle, separating stick.
						510	7.780	Irregular, brittle, 1".4 deep. Fibers crushed.
						498	7.580	Irregular, brittle at middle separating stick.
						646	9.850	Irregular, brittle break at middle.
						597	9.100	Short, brittle, .5 deep. Fibers crushed split along grain 24". (Photograph.)
						729	11.120	Square, brittle. Cracked along grain 10" separating stick. Fibers crushed.
						373	5.690	Broke at knots. Oblique fracture, 3½" long separating stick, 22 knots in stick from ¼" to ⅜" diameter.
						436	6.650	Oblique 3½" long, separating stick. 20 knots in stick from ¼" to ⅜" diameter. Cross-grained, warped.
						660	10.060	Square, brittle, .5 deep. Oblique fractures separating specimen. One end split into two pieces, 8 knots from ¼" to ⅜" diameter.
						649	9.900	Oblique, 12" long. Cross-grained.
						800	12.200	Do.
						326	4.970	Oblique 3½" long, 8" from end bearing. 14 knots in stick from ⅜" to ¾" diameter. Cross-grained.
						474	7.230	Oblique at knot 2" from middle bearing. 14 knots in stick from ⅜" to ¾" diameter

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	77
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*I*
397*a*	.6705	20		.449	.913	1.535	.....	.....	.....	.....	.....	...
882*a*	.5894	30		.457	.925	.....	.....	.....	.....	.....	.....	...
915*a*	.6580	22		.370	.846	.....	.....	.....	.....	.....	.....	...
631*a*	.5624	22		.354	.728	.....	.....	.....	.....	.....	.....	...
631*b*	.5714	22		.295	.583	.913	1.280	.126	1.358	.....	.....	...
821*a*	.4987	20		.217	.433	.681	.925	.035	.925	1.220	1.575	...
821*b*	.4811	18		.228	.504	.748	1.035	.043	1.063	1.417	.....	...
821*c*	.5114	24		.339	.669	1.012	1.417	.098	.....	.....	.....	...
914*a*	.6250	16		.295	.606	.945	1.346	.118	1.406	1.819	.....	...
315*a*	.5483	15		.142	.276	.421	.571	.012	.575	.740	.945	1.
315*b*	.5512	12		.146	.284	.413	.551	.016	.551	.701	.886	1.
785*a*	.4952	22		.185	.370	.551	.756	.032	.768	1.012	1.378	...
785*b*	.4191	16		.217	.453	.661	.925	.032	.945	1.260	.....	...
1074*a*	.4887	9		.157	.346	.512	.693	.012	.693	.906	1.181	...
1075*a*	.4790	9		.197	.382	.591	.787	.024	.799	1.024	1.583	...
1076*a*	.5222	8		.185	.362	.551	.768	.028	.768	.984	1.299	...
1076*b*	.5165	8		.165	.315	.484	.654	.020	.669	.846	1.118	...
996*a*	.5472	5		.303	.610	.882	1.213	.075	1.240	1.634	2.185	...

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	421	6.420	Failed at knot 3″ from middle. Oblique fracture 8″ long nearly separating stick, also fractures ″.8 deep at knot 10″ from middle.
.....	.....	.....	.....	.....	.....	265	4.040	Short, oblique at knot 1½″ from middle. 9 knots from ⅜″ to ½″ diameter.
.....	.....	.....	.....	.....	.....	278	4.240	Short, oblique at knots. 38 knots from ⅜″ to ½″ diameter.
.....	.....	.....	.....	.....	.....	273	4.160	Failed at knots. Oblique fracture 5″ long separating stick, 30 knots from ¼″ to ⅜″ diameter.
.....	.....	.....	.....	.....	.....	524	7.990	Irregular, brittle at knot 1½″ from middle. 24 knots from ¼″ to ½″ diameter.
.....	.....	.....	.....	.....	.....	726	11.070	Oblique 3½″ long at knot 8″ from middle.
.....	.....	.....	.....	.....	.....	640	9.760	Brittle, wedge-shaped, 2″ long. Piece 15″ long, detached compression side.
.....	.....	.....	.....	.....	.....	441	6.720	Short, brittle at middle.
.....	.....	.....	.....	.....	.....	652	9.940	Oblique 5″ long separating stick, 22 knots from ¼″ to ½″ diameter. Cross-grained.
.....	.....	.....	.....	.....	.....	842	12.840	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	880	13.420	Short, brittle. Fibers crushed.
.....	.....	.....	.....	.....	.....	758	11.560	Long, oblique beginning at corner extending from middle to end. Fibers crushed.
.....	.....	.....	.....	.....	.....	631	9.620	Short, brittle, separating stick at middle.
.....	.....	.....	.....	.....	.....	728	11.100	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	661	10.080	Brittle, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	765	11.660	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	752	11.470	Oblique, splintering beginning at middle, extending 15″. Fibers crushed.
.....	.....	.....	.....	.....	.....	760	11.590	Short, brittle, ″.5 deep. Oblique fracture, wedge shape, 3″ long, separating stick. Split along grain, 25″.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	77
			→	In.	In.	In.	In.	In.	In.	In.	In.	In
996*b*	.5800	4		.354	.846	1.362	1.976	.295	2.036	2.874	.....	.....
1154*a*	.6590	10		.252	.516	.787	1.083	.039	1.110	1.417	1.890	.....
1154*b*	.7913	12		.236	.461	.705	.984	.059	.996	.....	.....	.....
1155*a*	.4748	13		.236	.449	.654	.913	.043	.945	1.220	.....	.....
1155*b*	.4699	10		.220	.433	.654	.870	.032	.870	1.142	1.535	.....
1156*a*	.4250	10		.264	.484	.748	1.043	.043	1.063	1.378	.....	.....
619*a*	.5034	26		.157	.299	.453	.610	.012	.602	.768	.984	1.2
626*a*	.4789	22		.142	.307	.457	.610	.008	.610	.787	.953	1.2
630*a*	.4814	5		1.008	2.028	3.150	.....	.....	.....	.....	.....	.....
630*b*	.4748	6		.724	1.457	2.244	.....	.....	.....	.....	.....	.....
632*a*	.5502	30		.157	.315	.472	.630	.016	.638	.787	.984	1.
636*a*	.4429	16		.236	.472	.709	.976	.039	.996	1.319	1.732	.....
689*a*	.5080	16		.150	.295	.441	.579	.008	.591	.728	.906	1.
718*a*	.4502	14		.177	.346	.524	.709	.016	.709	.096	1.209	.....
718*b*	.4750	22		.165	.331	.500	.669	.020	.669	.882	1.102	.....
731*a*	.4796	10		.157	.315	.492	.661	.020	.658	.846	1.122	.....
731*b*	.4864	10		.165	.331	.488	.669	.024	.689	.846	1.083	.....
907*a*	.5206	14		.614	1.260	2.126	.....	.....	.....	.....	.....	.....

TABLE 1.--TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	661	10.080	Irregular, brittle, at middle. Oblique cracks, 24″ along grain.
.....	.....	.....	.....	.....	1.890	661	10.080	Short, brittle, ″.3 deep. Oblique fracture, 12″ long, separating stick.
.....	.....	.....	.....	.....	.....	520	7.930	Oblique, beginning at knot 5″ from middle.
.....	.....	.....	.....	.....	.....	558	8.510	Brittle, splintering, ″.4 deep. Oblique fracture along grain 12″.
.....	.....	.....	.....	.....	.....	722	11.010	Short, brittle, ″.4 deep. Oblique fracture, 14 long separating stick.
.....	.....	.....	.....	.....	.....	608	9.270	Square, brittle at middle. Oblique fracture detaching piece 10″ long, compression side.
.....	.....	.....	.....	.....	.....	829	12.640	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	875	13.340	Brittle, splintering. Fibers crushed. Split along grain 13″.
.....	.....	.....	.....	.....	.....	417	6.630	Brittle, ″.5 deep. Oblique fracture, detached piece 8″ long compression side, also fractured at knots 12″ from middle. Stick badly warped.
.....	.....	.....	.....	.....	.....	360	5.490	Short, brittle, ″.1 deep. Oblique fractures nearly detached piece 12″ long compression side. Warped.
.....	.....	.....	.....	.....	.....	850	12.960	Short, brittle, ″ 4 deep. Fibers crushed. Split along grain, 20″.
.....	.....	.....	.....	.....	.....	784	11.190	Square, brittle.
1.378	.....	.....	.....	.....	.....	978	14.910	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	720	10.980	Short, brittle, ″.4 deep. Fibers crushed. Split along grain 24″.
.....	.....	.....	.....	.....	.....	770	11.740	Square, brittle at middle. Oblique fracture, detached piece 16″ long, compression side.
.....	.....	.....	.....	.....	.....	737	11.240	Oblique, splintering. Fibers crushed. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	748	11.410	Short, brittle, ″.4 deep. Oblique fracture 16″ long separating stick.
.....	.....	.....	.....	.....	.....	368	5.612	Oblique, 5″ long at knots middle of stick.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—							
				110	220	331	441	0	441	551	661
			→	In.	In.	In.	In.	In.	In.	In.	In.
910*a*	.5277	11		.709	1.555	2.795	.....	.....	.....	.....	.....
633*a*	.5681	20		.386	.760	1.181	1.575	.150	1.646	2.185	.....
633*b*	.5758	22		.461	.976	.....	.....	.....	.....	.....	.....
667*a*	.5949	24		.157	.291	.433	.591	.020	.591	.748	.945
667*b*	.9330	20		.118	.260	.378	.512	.016	.520	.630	.787
664*a*	.5801	14		.307	.591	.906	1.240	.063	1.260	1.654	2.165
664*b*	.5982	12		.220	.480	.717	1.012	.051	1.016	1.276	1.721
997*a*	.6455	6		.106	.217	.323	.453	.008	.457	.567	.709
997*b*	.6199	9		.138	.276	.402	.551	.012	.551	.709	.839
293*a*	.4551	8		.354	.768	.....	.....	.....	.....	.....	.....
293*b*	.4265	8		.366	.748	.....	.....	.....	.....	.....	.....
563*a*	.4546	18		.197	.394	.591	.815	.020	.827	1.063	1.476
625*a*	.4600	20		.224	.433	.661	.933	.039	.925	1.260	.....
625*b*	.4611	20		.197	.394	.591	.795	.025	.811	1.083	.....
644*a*	.5460	10		.374	.728	1.142	1.693	.181	1.752	2.402	3.740
644*b*	.5426	8		.295	.598	.886	1.260	.079	1.299	1.732	2.461
1157*a*	.4443	16		.157	.315	.480	.638	.008	.654	.839	1.083
1157*b*	.4323	12		.181	.362	.575	.787	.020	.787	1.063	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—				Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.			
					413	6.300	Failed at knot 3″ from middle. Cross-grained.
				2.185	551	8.400	Brittle, ″.1 deep. Oblique fracture 5″ long, separating stick, split along grain 22″.
					298	4.540	Failed at knots. Stick contains 10 knots from ¼″ to ⅜″ diameter. Cross-grained. Warped.
					848	12.930	Coarse, splintering. Fibers crushed.
					991	15.110	Brittle and splintering, ″.5 deep. Fibers crushed.
					850	12.960	Brittle, ″.5 deep. Split along grain 24″.
					714	10.890	Oblique, splintering along grain. End bearings indented opposite corners.
					985	15.020	Oblique, splintering. Fibers crushed.
					881	13.430	Splintered at knot 3½″ from middle. Fibers crushed at knots and middle bearing.
					270	4.120	Failed at knots 4″ from middle.
					327	4.980	Short, brittle at knots 2″ from middle.
					698	10.640	Irregular, brittle 1″.4 deep. Fibers crushed. Opened crack along grain 20″.
					635	9.680	Irregular, brittle at knots middle of stick, contains 7 knots from ¼″ to ½″ diameter.
					724	11.040	Square, brittle middle of stick.
					695	10.600	Irregular, brittle ″.6 deep. Oblique cracks along grain also fractured at knots 7″ from end.
					771	11.760	Irregular, brittle ″.6 deep, slight crushing. Split along grain. Cross-grained.
					770	11.740	Short, brittle 1″.2 deep. Fibers crushed. Split along grain.
					661	10.080	Failed at knot ¾″ diameter 4″ from middle. Fibers crushed. Split along grain.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	77
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*I*
676*a*	.4834	3		.217	.441	.669	.925	.039	.933	1.220	.....	....
676*b*	.5096	3		.169	.354	.563	.772	.016	.780	1.024	1.315	....
576*a*	.4072	4		.543	1.063	.....	.....	.....	.....	.....	.....	....
576*b*	.3901	4		.370	.776	1.205	1.772	.189	1.890	.....	.....	....
82*a*	.6068	5		.118	.236	.354	.472	.016	.484	.614	.748	.8
82*b*	.6148	5		.110	.228	.343	.461	.008	.465	.571	.693	.8
355*a*	.5914	6		.284	.602	.917	1.299	.098	1.299	1.732	2.264	....
355*b*	.5847	3½		.217	.445	.693	.945	.059	.965	1.283	.....	....
388*a*	.5600	22		.138	.295	.433	.591	.012	.591	.732	.925	1.1
388*b*	.4806	4		.217	.433	.669	.945	.043	.945	.....	.....	....
389*a*	.4676	3		.209	.410	.630	.882	.039	.886	1.158	1.516	....
389*b*	.4938	5		.169	.354	.512	.709	.020	.709	.906	1.189	....
13*a*	.5671	9		.276	.591	.929	1.319	.118	1.339	1.803	2.500	....
13*b*	.5943	9		.248	.500	.787	1.122	.094	1.150	1.476	1.969	2.6
1046*a*	.4371	10		.354	.717	1.083	1.638	.157	1.681	2.362	.....	....
1046*b*	.5140	7		.512	1.043	1.575	2.362	.315	2.480	3.465	.....	....
83*a*	.7591	13		.169	.331	.484	.669	.024	.669	.846	1.063	1.2
83*b*	.7517	12		.157	.327	.496	.669	.020	.685	.874	1.063	1.2

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—				Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323	Total pounds.	Modulus of rupture.	
In.	In.	In.	In.	In.			
					630	9.610	Fracture began at knot 1".5 from middle. Split along grain 18". Cross-grained.
					760	11.590	Failed at knots 1" and 8" from middle.
					275	4.190	Irregular, brittle across stick at knots 4" from middle. Detached wedge-shaped piece 5" long, compression side. 12 knots from ¼" to ⅝" diameter.
					495	7.550	Brittle across stick at middle. Detached wedge-shaped piece 7" long, compression side.
1.142					940	14.330	Coarse, splintering. Fibers crushed.
1.012	1.189	1.465			1,156	17.630	Brittle 1".4 deep. Fibers crushed. Split along grain 16".
					742	11.310	Fractured tension side. Splitting from middle 20" along grain.
					625	9.530	Fractured at corner. Crack extending 10" along grain.
1.496					952	14.520	Square, brittle, separating stick at middle.
					530	8.080	Short, brittle ".5 deep. Oblique fracture, 7" long, separating stick.
					728	11.100	Fractured at corners, extending 16" along grain separating stick. Cross-grained.
					748	11.410	Irregular, brittle ".4 deep. Oblique fracture, 17" long, separating stick.
					749	11.420	Irregular, brittle ".6 deep. Detached piece 18" long, tension side.
					800	12.200	Oblique, beginning 5" from middle, reaching to middle bearing and separating stick. Split 18" along grain.
					608	9.270	Irregular, brittle ".4 deep. Split along grain 30". Slight crushing.
					624	9.510	Short, brittle ".4 deep. Oblique fracture, 5½" long, separating stick. Split along grain, 18".
1.535	1.909				1,090	16.620	Coarse, splintering.
1.673	2.071				1,102	16.800	Oblique, splintering, one corner. Fibers crushed. End bearings indented opposite corners.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
622a	.5536	12		.276	.551	.866	1.220	.020	1.299	.....	.....	.....
621a	.5403	6		.413	.827	1.272	1.929	.236	2.008	2.795	.....	.....
1169a	.5610	9		.256	.492	.768	1.063	.063	1.083	1.409	1.874	2.50
1169b	.5704	7		.354	.728	1.161	1.693	.209	1.772	.....	.....	.....
1172a	.5920	6		.425	.898	1.417	1.969	.236	2.067	2.795	4.488	.....
1172b	.7088	4		.516	1.075	1.614	2.362	.248	2.500	3.465	.....	.....
279a	.5341	4		.334	.728	1.260	.....	.....	.....	.....	.....	.....
279b	.5218	4		.323	.689	1.102	1.575	.138	1.622	.....	.....	.....
321a	.5159	7		.283	.610	.945	1.378	.138	1.398	1.850	2.520	.....
321b	.5301	10		.197	.394	.650	.913	.047	.913	1.213	.....	.....
671a	.5574	4		.185	.354	.520	.728	.012	.709	.913	1.142	1.417
671b	.5887	7		.157	.295	.465	.591	0	.598	.748	.945	1.122
278a	.6523	5		.157	.307	.441	.594	.008	.598	.748	.945	1.15
278b	.6489	5		.138	.272	.425	.559	.012	.559	.709	.866	1.06
319a	.6517	9		.130	.264	.394	.516	0	.520	.650	.795	.98
142a	.4651	5		.303	.583	.913	1.260	.118	1.307	.....	.....	.....
142b	.4034	5		.299	.583	.886	1.260	.094	1.268	.....	.....	.....
544a	.3535	2½		.874	1.850	.....	.....	.....	.....	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	528	8.050	Failed at knot $\frac{7}{16}$" diameter, opposite middle bearing.
.....	.....	.....	.....	.....	.....	640	9.760	Brittle, ".6 deep. Split along grain 17".
.....	.....	.....	.....	.....	.....	805	12.270	Irregular, brittle, 1" deep. Split along grain, ".25 intersecting "Cooper" lines developed on two faces.
.....	.....	.....	.....	.....	.....	470	7.170	Failed at knot $\frac{3}{4}$" diameter, 1" from middle, separating stick.
.....	.....	.....	.....	.....	.....	680	10.370	Irregular, brittle, at middle. Oblique fractures split stick into four pieces.
.....	.....	.....	.....	.....	.....	600	9.150	Oblique, 7" long, separating stick. Knot tension side 5" from middle.
.....	.....	.....	.....	.....	.....	405	6.170	Failed at knot 10" from middle. Oblique fracture 6" long, separating stick.
.....	.....	.....	.....	.....	.....	540	8.230	Cross-grained fracture, $3\frac{1}{2}$" long, separating stick. Split along grain 8".
.....	.....	.....	.....	.....	.....	725	11.050	Irregular, brittle, ".8 deep. Wedge-shaped piece 26" long, detached compression side.
.....	.....	.....	.....	.....	.....	640	9.760	Oblique, 9" long, near end separating stick. Cross-grained.
1.850	.....	.....	.....	.....	.....	946	14.420	Square, brittle, middle of stick split along grain 15".
1.378	1.732	.....	.....	.....	.....	997	15.200	Square, brittle, middle of stick split along grain 7".
.....	.....	.....	.....	.....	.....	822	12.530	Fracture began at corner 2" from middle. Split along grain 22".
1.260	1.772	.....	.....	.....	.....	992	15.130	Coarse, splintering. Fibers crushed.
1.161	1.339	1.713	.....	.....	.....	1,118	17.050	Brittle, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique fracture 15" long, following grain across stick. Cross-grained.
.....	.....	.....	.....	.....	.....	587	8.190	Irregular, brittle, ".6 deep. Oblique fractures along grain 20".
.....	.....	.....	.....	.....	.....	248	3.780	Brittle at middle, separating stick.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	77
			→	In.	In.	In.	In.	In.	In.	In.	In.	I
544b	.3499	2		.787	1.614	.....	.....	.....	.....	.....	.....	...
544c	.4268	2½		.787	1.654	2.776	.....	.....	.....	.....	.....	...
764a	.5089	3		.343	.709	1.142	1.654	.205	1.693	2.362	3.504	....
761b	.4713	4		.323	.650	1.024	1.457	.150	1.496	2.008	.....	...
394a	.4912	14		.335	.669	1.063	1.535	.197	1.583	.....	.....	...
394b	.4917	14		.236	.500	.772	1.083	.055	1.087	1.496	.....	...
780a	.5190	18		.146	.283	.425	.563	.012	.563	.717	.906	1.1
780b	.4297	9		.220	.410	.646	.807	.039	.827	.....	.....	...
879a	.4838	18		.197	.413	.669	.....	.....	.....	.....	.....	...
879b	.5129	18		.185	.354	.539	.724	.016	.724	1.181	1.457	....
81a	.9375	24		.118	.236	.354	.488	.008	.492	.614	.748	.8
81b	.8125	22		.126	.244	.366	.488	.012	.500	.610	.748	.9
81c	.6949	28		.197	.362	.551	.717	.016	.717	.906	1.102	...
81d	.9823	24		.118	.236	.354	.496	.012	.484	.614	.748	.8
85a	.6164	16		.236	.433	.669	.913	.059	.945	1.240	1.634	2.1
85b	.6632	16		.118	.244	.362	.484	.012	.484	.610	.748	.9
85c	.7565	11		.185	.354	.539	.740	.039	.740	.945	1.220	1.4
85d	.8800	5		.299	.610	.925	1.280	.071	1.299	1.665	2.165	2.7

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	902	1102	1213	2323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	320	4.880	Brittle at knot 3″ from middle, compression side detaching piece 5″ long. Warped.
.....	.....	.....	.....	.....	.....	407	6.200	Brittle, 6″ deep, splitting across stick. Split along grain 24″, also broke square across at knot 3½″ from end.
.....	.....	.....	.....	.....	.....	720	10.980	Irregular, brittle, across stick at middle. Split along grain 22″, detaching two pieces.
.....	.....	.....	.....	.....	.....	595	9.070	Irregular, brittle, across stick at middle. Split along grain 16″, detaching piece 8″ long. 9 knots in stick, ⅜″ to ¼″ diameter.
.....	.....	.....	.....	.....	.....	540	8.230	Irregular, brittle, across stick at middle.
.....	.....	.....	.....	.....	.....	610	9.300	Cross-grained fracture at knots 11″ from middle, extending along grain 20″.
1.496	.....	.....	.....	.....	.....	890	13.570	Long, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	535	8.160	Coarse, splintering. Failed at knot, middle of stick.
.....	.....	.....	.....	.....	.....	422	6.430	Failed at knot, middle of stick.
.....	.....	.....	.....	.....	.....	680	10.370	Coarse, splintering, failing at knot ".15 diameter. 2″ from middle.
1.063	1.280	.....	.....	.....	.....	1,092	16.650	Long oblique, beginning at corner 5″ from middle extending 20″ along grain. 50 per cent. sap wood tension side.
1.071	1.248	1.476	.....	.....	.....	1,190	18.150	Brittle, irregular, 1″.4 deep at middle. (Photograph.)
.....	.....	.....	.....	.....	.....	771	11.760	Brittle, splintering ".8 deep. Fibers crushed.
1.032	1.220	1.535	.....	.....	.....	1,166	17.780	Long, splintering and brittle ".7 deep. Fibers crushed. (Photograph.)
.....	.....	.....	.....	.....	.....	772	11.770	Brittle, ".6 deep. Oblique fracture 8″ long separating stick.
1.110	.....	.....	.....	.....	.....	974	14.850	Brittle, ".3 deep. Fibers crushed.
.....	.....	.....	.....	.....	.....	882	13.450	Square, brittle, ".6 deep. Oblique fracture 8″ long separating stick. 30 per cent. sap wood compression side.
.....	.....	.....	.....	.....	.....	880	13.420	Brittle, splintering. Split along grain from middle to end. Oblique crack 8″ long separating stick at middle.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	7
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*I*
243*a*	.7086	18		.098	.217	.315	.421	0	.429	.547	.654	.
243*b*	.7066	19		.091	.224	.323	.433	0	.433	.535	.654	.
357*a*	.6642	20		.118	.248	.362	.484	.012	.492	.610	.748	.
357*b*	.8409	18		.118	.224	.335	.445	.012	.449	.551	.669	.
358*a*	.8906	11		.134	.276	.394	.528	.016	.539	.661	.811	1.
358*b*	.8705	19		.118	.217	.339	.449	.008	.453	.551	.669	.
359*a*	.7969	12		.118	.228	.354	.457	.012	.472	.571	.689	.
359*b*	.8728	16		.118	.236	.374	.496	.008	.496	.614	.748	.
360*a*	.7654	16		.114	.217	.331	.449	0	.449	.551	.669	.
360*b*	.7240	18		.157	.295	.433	.575	.016	.575	.724	.886	1.
361*a*	.7585	15		.094	.197	.283	.394	0	.394	.492	.591	.
361*b*	.7480	17		.094	.189	.287	.386	.012	.394	.472	.591	.
384*a*	.6005	22		.201	.398	.598	.799	.024	.807	1.051	.....	...
384*b*	.6439	20		.118	.232	.335	.453	.008	.457	.559	.689	.
385*a*	.7040	8½		.157	.315	.449	.610	.016	.606	.772	.945	1.
390*a*	.6739	14		.106	.217	.335	.433	0	.441	.559	.669	.
390*b*	.6296	20		.118	.248	.362	.488	.008	.504	.610	.756	.
1096*a*	.6375	8		.177	.331	.496	.661	.024	.661	.846	1.043	1.

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
906	1.051	1.272	.....	.....	.....	1,190	18.150	Brittle, splintering ".4 deep. Fibers crushed, split along grain 30".
906	1.083	1.280	1.559	.....	1.559	1,213	18.500	Brittle, splintering ".5 deep. Fibres crushed. Opened cracks along grain.
1.063	1.220	1.476	.....	.....	1.476	1,102	16.800	Brittle, ".8 deep. Opened cracks along grain 15".
925	1.114	1.299	1.516	1.772	.....	1,380	21.060	Brittle, 1" deep. Split along grain.
1.193	1.417	1.772	.....	.....	.....	1,212	18.480	Square, brittle, at middle. (Photograph.)
1.063	1.260	1.496	1.843	.....	.....	1,310	19.980	Long, splintering. Split along grain at one corner 36". (Photograph).
984	1.142	1.339	.....	.....	.....	1,160	17.690	Brittle, splintering, fibers on one corner not broken. End bearings indented opposite corners.
1.063	1.240	1.457	1.732	.....	.....	1,315	20.050	Coarse, splintering, and short brittle ".5 deep. Split along grain 20".
906	1.063	1.240	1.457	.....	.....	1,300	19.820	Coarse, splintering, and brittle. Slight crushing.
1.299	1.575	.....	.....	.....	.....	1.100	16.770	Irregular, 3" long at middle, separating stick.
.815	.945	1.102	.....	.....	.....	1,210	18.450	Coarse, splintering. Fibers crushed.
.795	.929	1.102	1.339	.....	.....	1,245	18.980	Do.
.....	.....	.....	.....	.....	.....	605	9.220	Oblique, 8" long, separating stick. Cross-grained.
.965	1.142	1.437	.....	.....	.....	1,102	16.800	Coarse, splintering, ".6 deep. Fibres crushed.
1.378	.....	.....	.....	.....	.....	984	15.000	Oblique, brittle, ".4 deep. Split along grain, 30".
.984	1.201	.....	.....	.....	.....	1,070	16.320	Brittle, ".1 deep, split along grain 15". Fibers crushed.
1.122	1.496	.....	.....	.....	.....	998	15.220	Short, brittle, ".2 deep one corner. Coarse, splintering, other corner. Fibers crushed.
1.585	1.890	.....	.....	.....	.....	1,095	16.700	Long, coarse, splintering, knot, ".15 diam., ½" from middle, near compression side.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—							
				110	220	331	441	0	441	551	661
			→	In.	In.	In.	In.	In.	In.	In.	In.
1096b	.6852	13		.130	.264	.374	.512	.012	.520	.650	.807
84a	.6932	22		.130	.295	.441	.602	.008	.610	.768	.965
84b	.6646	20		.165	.328	.488	.650	.016	.646	.819	.996
84c	.8313	9		.130	.260	.394	.512	.008	.520	.678	.787
356a	.7716	16		.102	.197	.307	.406	.008	.402	.512	.610
356b	.7710	17		.098	.197	.287	.394	.012	.394	.472	.591
493a	.8404	18		.130	.260	.394	.535	.039	.555	.717	.886
493b	.8940	20		.110	.228	.350	.492	.020	.496	.630	.811
231a	.5604	14		.126	.260	.394	.532	.012	.543	.669	.835
231b	.5429	12		.157	.315	.492	.650	.016	.669	.866	1.130
373a	.4588	16		.213	.417	.646	.894	.039	.906	1.181	.....
776a	.4697	13		.181	.362	.571	.827	.047	.846	.....	.....
776b	.4919	16		.157	.315	.472	.646	.020	.650	.866	1.142
794a	.4296	19		.193	.362	.543	.748	.024	.752	1.024	1.614
794b	.4153	16		.157	.354	.532	.748	.020	.768	1.063	.....
880a	.4425	20		.197	.394	.591	.835	.035	.846	1.181	.....
880b	.4785	20		.205	.441	.685	.929	.039	.961	1.240	1.850
513a	.4455	14		.244	.500	.756	1.063	.063	1.079	1.476	2.185

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
1.142	1.394	.....	.....	.....	.....	1,080	15.710	Oblique, beginning at corner, 15″ from middle, splitting along grain to opposite end. Stick worm-eaten.
1.406	1.732	.....	.....	.....	.....	1,100	16.780	Irregular, brittle, separating stick at middle.
1.437	.....	.....	.....	.....	.....	985	15.020	Oblique along grain beginning at corner, 14″ from middle, extending along grain 22″.
1.122	1.299	1.535	.....	.....	.....	1,212	18.480	Short, brittle, ″.3 deep at one corner. Oblique fracture 17″ long, separating end of stick.
.839	.964	1.181	.....	.....	1.575	1,195	18.220	Coarse, splintering. Fibers crushed.
.827	.945	1.102	1.240	1.543	.....	1,378	21.010	Do.
1.240	1.457	.....	.....	.....	.....	1,100	16.770	Short, brittle, middle of stick.
1.150	.....	.....	.....	.....	.....	940	14.330	Brittle, ″.6 deep. Oblique fracture 6″ long, separating stick.
.....	.....	.....	.....	.....	.....	875	13.340	Short, brittle, ″.6 deep, failing at knot ″.15 diam., 1″.3 from middle. Fibers crushed.
.....	.....	.....	.....	.....	.....	848	12.980	Brittle, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	657	10.020	Short, brittle ″.4 deep, 1″.5 from middle. Fibers crushed.
.....	.....	.....	.....	.....	.....	475	7.240	Failed at knot 5½″ from middle. Split along grain 12″. Stick contains 10 knots from ¼″ to ⅝″ diam. Fibres crushed.
.....	.....	.....	.....	.....	.....	784	11.950	Short, splintering. Fibers crushed. Knot at neutral axis, middle of stick. Stick contains 10 knots from ¼″ to ½″ diam.
.....	.....	.....	.....	.....	.....	675	10.290	Square, brittle, ″.7 deep. Fibers crushed. Split along grain 15″.
.....	.....	.....	.....	.....	.....	660	10.060	Square, brittle, separating stick at middle.
.....	.....	.....	.....	.....	.....	645	9.830	Do.
.....	.....	.....	.....	.....	.....	697	10.630	Square, brittle at middle. Fibers crushed. Split along grain 22″, detaching piece 15″ long.
.....	.....	.....	.....	.....	.....	692	10.550	Square, brittle, ″.2 deep. Fibers crushed. Split along grain 22″. 12 knots from ¼″ to ½″ diam.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—							
				110	220	331	441	0	441	551	661
			→	In.	In.	In.	In.	In.	In.	In.	In.
513b	.4963	10		.283	.559	.882	1.287	.157	1.319	1.799	.....
773a	.4578	12		.150	.307	.472	.630	.020	.638	.827	1.150
773b	.4597	16		.165	.339	.512	.698	.020	.709	.906	1.240
784a	.4411	18		.205	.394	.610	.839	.039	.858	1.165	.....
784b	.4529	18		.197	.394	.602	.839	.024	.846	1.161	1.701
791a	.4319	14		.157	.311	.472	.669	.028	.669	.886	1.161
791b	.4163	12		.169	.335	.512	.689	.016	.709	.945	.....
292a	.4325	18		.197	.374	.551	.748	.024	.748	.984	1.417
292b	.3642	18		.346	.654	1.039	.....	.....	.....	.....	.....
575a	.3411	24		.256	.512	.748	1.102	.094	1.165	.....	.....
822	.3804	20		.217	.445	.685	1.024	.087	1.071	.....	.....
269_1a	.3939	8		.354	.669	1.102	.....	.....	.....	.....	.....
270_1a	.4036	10		.433	.866	1.386	.....	.....	.....	.....	.....
270_2a	.3810	10		.315	.598	.972	1.555	.217	.....	.....	.....
970a	.4676	20		.209	.402	.598	.866	.063	.886	1.220	1.811
970b	.4568	20		.181	.354	.528	.717	.028	.736	.984	1.339
977a	.4038	10		.177	.335	.520	.748	.039	.748	1.063	.....
977b	.3882	10		.185	.362	.563	.827	.059	.858	1.280	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	661	10.080	Irregular, brittle, 1".4 deep. Fibers crushed.
.....	.....	.....	.....	.....	.....	764	11.650	Coarse, splintering. Fibers crushed at middle, also at knots, 8" either side.
.....	.....	.....	.....	.....	.....	746	11.370	Irregular, brittle, separating stick at middle.
.....	.....	.....	.....	.....	.....	649	9.900	Square, brittle, at middle of stick.
.....	.....	.....	.....	.....	.....	688	10.490	Do.
.....	.....	.....	.....	.....	.....	762	11.620	Brittle, ".15 deep. Fibers crushed. Split along grain 15" from middle towards end.
.....	.....	.....	.....	.....	.....	661	10.080	Irregular, brittle, ".5 deed. Fibers crushed.
.....	.....	.....	.....	.....	.....	712	10.860	Short, brittle, ".5 deep. Fibers crushed. Split along grain. Three knots ½" diamter. (Photograph.)
.....	.....	.....	.....	.....	.....	395	6.020	Square fracture at knot, 4½" from middle.
.....	.....	.....	.....	.....	.....	515	7.850	Square, brittle, at middle.
.....	.....	.....	.....	.....	.....	543	8.280	Coarse, splintering at one corner, square break, completing fracture at middle.
.....	.....	.....	.....	.....	.....	415	6.330	Failed at knot 2½" from middle. Cross-grained fracture 12" long, separating stick. 7 knots ⅜" to ½" diameter.
.....	.....	.....	.....	.....	.....	364	5.550	Failed at knot 1½" from middle; 11 knots ⅜" to ½" diameter.
.....	.....	.....	.....	.....	.....	508	7.750	Irregular, brittle, at middle.
.....	.....	.....	.....	.....	2.461	690	10.520	Slight, splintering. Fibers crushed.
.....	.....	.....	.....	.....	2.087	697	10.630	Do.
.....	.....	.....	.....	.....	.....	641	9.770	Short, fine, splintering. Fibers crushed at middle and 3½" from middle.
.....	.....	.....	.....	.....	.....	597	9.100	Slight, splintering. Fibers crushed.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—							
				110	220	331	441	0	441	551	661
			→	In.	In.	In.	In.	In.	In.	In.	In.
1015a	.4398	18		.157	.295	.449	.606	.016	.622	.827	1.122
1019a	.3517	10		.193	.394	.583	.866	.059	.890	1.390	.....
1019b	.3688	9		.173	.354	.535	.776	.043	.787	1.102	.....
1026a	.3892	11		.299	.591	.961	1.433	.169	1.496	.....	.....
1026b	.3810	8		.315	.598	.972	.....	.....	.....	.....	.....
5a	.4210	20		.252	.472	.701	.984	.039	1.000	.....	.....
5b	.3989	20		.244	.492	.756	1.063	.079	1.098	.....	.....
219a	.4716	20		.177	.362	.551	.748	.024	.748	.976	1.358
219b	.4699	20		.189	.382	.563	.768	.028	.780	.984	1.299
775a	.4922	14		.394	.803	1.339	1.929	.283	2.008	2.736	.....
775b	.4458	7		.445	.890	1.398	2.095	.307	2.126	2.835	.....
778a	.3496	20		.283	.559	.858	1.291	.157	1.299	.....	.....
778b	.3675	22		.287	.579	.894	1.358	.118	1.417	.....	.....
787a	.4811	20		.197	.394	.591	.807	.024	.827	1.083	1.406
787b	.4805	18		.177	.354	.532	.728	.024	.736	.945	1.280
798a	.5264	28		.169	.327	.512	.689	.020	.709	.906	1.161
798b	.5248	30		.157	.299	.453	.602	.008	.614	.768	.....
772a	.5124	28		.169	.339	.504	.669	.012	.661	.866	1.122

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
Ins.	*In.*	*In.*	*In.*	*In.*	*In.*			
						729	11.120	Splintering, ".2 deep. Fibers crushed at middle and 2½" from middle.
						578	8.810	Splintering, ".5 deep. Fibers crushed at middle and 3" from middle.
						633	9.650	Splintering, ".2 deep. Fibers crushed at middle and 3" from middle.
						520	7.930	Square fracture, ".4 deep. Crack detached piece 16" long Cross-grained.
						405	6.170	Oblique, 6" long, separating stick at middle. Cross-grained.
						540	8.230	Coarse, splintering, ".7 deep. Cracked along grain 15".
						551	8.400	Coarse, oblique, splintering. Split along grain 25". Slight crushing.
						695	10.500	Coarse, splintering, ".2 deep. Fibers crushed. Split along grain 11".
						749	11.420	Square, brittle, middle of stick. Split along grain 17".
						638	9.730	Square, brittle, ".5 deep. Oblique fracture, 11" long, separating stick at one end.
						598	9.120	Irregular, brittle, separating stick at middle. Oblique fractures separate stick into 5 pieces.
						510	7.780	Square, brittle, at middle.
						498	7.590	Square, brittle, at middle. Knot, ".25 diameter, near middle compression side.
						702	10.700	Irregular, brittle, nearly separating stick. Split along grain 20".
						744	11.340	Irregular, brittle, nearly separating stick. Split along grain 20". Fibers crushed.
						790	12.050	Brittle, ".3 deep. Fibers crushed. 6 knots from ⅜" to ⅝" diameter.
						963	14.680	Square, brittle, separating stick at middle. Split along grain 25".
						846	12.900	Brittle and splintering, 1".1 deep. Fibers crushed. Split along grain 25".

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—							
				110	220	331	441	0	441	551	661
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
772*b*	.5129	28		.169	.327	.492	.669	.016	.677	.866	1.063
817*a*	.4041	22		.201	.390	.606	.866	.032	.874	1.201	.....
817*b*	.3748	24		.236	.472	.717	1.063	.059	1.102	.....	.....
1040*a*	.5095	28		.252	.516	.803	1.102	.079	1.102	1.417	1.850
1040*b*	.5114	20		.256	.504	.736	1.016	.051	1.024	1.319	1.693
1042*a*	.4248	7		.181	.374	.567	.799	.028	.807	1.083	.....
1042*b*	.4244	7		.209	.429	.646	.913	.051	.933	1.260	.....
623*a*	.5335	16		.276	.539	.835	.....	.....	.....	.....	.....
971*a*	.5318	18		.189	.378	.567	.827	.055	.846	.....	.....
995*a*	.5900	28		.118	.236	.366	.496	.016	.568	.630	.776
995*b*	.5472	28		.126	.260	.378	.520	.008	.520	.650	.807
980*a*	.4690	20		.256	.504	.768	1.063	.043	1.098	1.417	2.185
980*b*	.4714	20		.248	.488	.744	1.039	.055	1.051	1.398	1.898
271₂*a*	.4854	24		.236	.457	.669	.917	.035	.933	1.260	1.732
271₂*b*	.4786	30		.224	.433	.650	.945	.039	.945	1.299	.....
271₂	.4875	30		.173	.335	.512	.689	.024	.709	.906	1.161
627*a*	.5735	28		.110	.236	.362	.496	0	.496	.630	.768
627*b*	.5382	24		.157	.283	.433	.571	.008	.575	.717	.906

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	870	13.270	Short, brittle, nearly separating stick. Fibers crushed. Split along grain 30″ (Photograph.)
.....	.....	.....	.....	.....	.....	602	9.180	Square, brittle, middle of stick.
.....	.....	.....	.....	.....	.....	525	8.000	Do.
.....	.....	.....	.....	.....	.....	798	12.170	Square, brittle, ″.3 deep. Fibers crushed. Split along grain 28″. Piece 15″ long detached compression side.
.....	.....	.....	.....	.....	.....	808	12.320	Coarse, splintering. (Photograph.)
.....	.....	.....	.....	.....	.....	661	10.080	Coarse, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	661	10.080	Irregular, brittle, 1″.25 deep. Slight crushing.
.....	.....	.....	.....	.....	.....	434	6.620	Oblique, 8″ long. 22 knots from ½″ to ⅝″ diameter. Cross-grained.
.....	.....	.....	.....	.....	.....	536	8.170	Failed at knots 3″ to 4″ from middle. 3 knots ½″ diameter. Cross-grained.
1.201	1.535	.....	.....	.....	.....	1,038	15.830	Coarse, splintering. Fibers crushed.
1.389	.....	.....	.....	.....	.....	991	15.110	Do.
.....	.....	.....	.....	.....	.....	676	10.310	Square, brittle, middle of stick. Split along grain 20″.
.....	.....	.....	.....	.....	.....	677	10.320	Square, brittle, middle of stick. Split along grain 13″.
.....	.....	.....	.....	.....	.....	730	11.130	Brittle, splintering, nearly separating stick at middle. Fibers crushed. Split along grain 15″.
.....	.....	.....	.....	.....	.....	626	9.550	Short, brittle, ″.3 deep. Oblique fracture detached wedge-shaped piece 25″ long, compression side.
.....	.....	.....	.....	.....	.....	798	12.170	Split along neutral axis 28″. Fibers crushed.
1.201	.....	.....	.....	.....	.....	987	15.050	Fine, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	881	13.430	Do.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—							
				110	220	331	441	0	441	551	661
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
702*a*	.4373	3½		.217	.413	.669	.886	.059	.906	.....	.....
704*a*	.6591	7		.126	.236	.354	.476	.012	.480	.591	.728
705*a*	.5796	8		.169	.315	.457	.622	.020	.630	.799	1.004
706*a*	.5477	28		.138	.276	.410	.535	.012	.551	.669	.866
708*a*	.6688	6		.122	.236	.354	.484	.008	.492	.591	.732
708*b*	.6892	6		.106	.213	.323	.433	0	.441	.551	.669
709*a*	.4375	18		.177	.354	.535	.736	.016	.748	.972	1.268
709*b*	.4449	20		.165	.354	.524	.701	.020	.709	.925	1.181
720*a*	.5346	26		.181	.362	.551	.772	.020	.803	1.043	1.409
720*b*	.5449	20		.157	.315	.472	.638	.016	.661	.827	1.083
732*a*	.5227	13		.157	.307	.461	.630	.016	.630	.819	1.043
732*b*	.5091	13		.165	.331	.512	.701	.024	.709	.921	1.201
881*a*	.5602	22		.193	.394	.614	.866	.039	.866	1.142	1.417
881*b*	.5704	22		.165	.346	.528	.732	.020	.728	.969	1.205
973*a*	.5006	8		.157	.315	.480	.669	.016	.689	.866	1.150
973*b*	.4909	6		.165	.335	.500	.669	.012	.689	.886	1.130
974*a*	.5307	18		.142	.268	.398	.532	.012	.535	.689	.874
989*a*	.6017	10		.157	.323	.492	.669	.016	.677	.850	1.063

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	539	8.220	Coarse, splintering. Fibers crushed.
1.063	1.260	1.516	.....	.....	.....	1,210	18.450	Do.
.....	.....	.....	.....	.....	.....	877	13.370	Oblique, 16″ long, separating stick.
1.555	.....	.....	.....	.....	.....	882	13.430	Brittle, splintering, 1″ deep. Fibers crushed.
1.063	1.339	1.795	.....	.....	.....	1,175	17.920	Coarse, splintering. Fibers crushed.
.965	1.142	1.358	1.752	.....	.....	1,238	18.880	Splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	720	10.980	Oblique, beginning at corner opposite middle bearing, extending 13″ along grain. End bearings indented opposite corners.
.....	.....	.....	.....	.....	.....	753	11.480	Oblique, 17″ long, separating specimen beginning at middle. Fibers crushed.
.....	.....	.....	.....	.....	1.409	661	10.080	Oblique, 11″ long, separating specimen. Ends indented opposite corners.
.....	.....	.....	.....	.....	.....	866	13.200	Coarse, oblique, splintering. Split along grain 18″. End bearings indented opposite corners.
.....	.....	.....	.....	.....	1.417	772	11.760	Split along grain 10″ tension side. Fibers crushed.
.....	.....	.....	.....	.....	1.201	661	10.080	Split obliquely along grain tension side opposite middle bearing, extending 10″. Slight crushing.
.....	.....	.....	.....	.....	.....	877	13.370	Coarse, brittle. Opened cracks along grain 18″. Slight crushing at middle bearing.
2.028	.....	.....	.....	.....	.....	918	14.000	Oblique crack beginning at corner, 4″ from middle; cracks along grain 18″; 5 knots ¼″ to ⅜″ diameter.
.....	.....	.....	.....	.....	.....	726	11.070	Irregular, brittle, nearly separating stick.
.....	.....	.....	.....	.....	.....	771	11.760	Square, brittle at middle. Split along grain 20″.
.....	.....	.....	.....	.....	.....	848	12.930	Oblique, splintering, beginning at middle extending 16″. Fibers crushed.
1.772	.....	.....	.....	.....	.....	948	14.460	Square, brittle, ".6 deep. Fibers crushed. Split along grain 38″.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	771
			→	In.	In.	In.	In.	In.	In	In.	In.	In.
1008a	.4879	5½		.154	.287	.433	.579	.012	.591	.748	1.004	.....
1008b	.5500	10		.118	.236	.354	.492	0	.480	.610	.768	1.047
1016a	.5960	24		.118	.224	.346	.472	.008	.484	.591	.748	.945
1016b	.6085	22		.118	.236	.354	.457	.008	.472	.583	.724	.921
1018a	.6130	11		.118	.236	.346	.465	.008	.465	.575	.709	.886
1018b	.6136	11		.106	.220	.339	.457	.008	.472	.571	.728	.906
1020a	.4632	24		.173	.354	.524	.709	.020	.709	.945	1.339	.....
1020b	.4485	24		.197	.394	.598	.835	.028	.846	1.122	.....	.....
1011a	.5386	10		.157	.283	.433	.571	.020	.583	.736	.945	1.240
1011b	.5325	8		.161	.323	.484	.661	.016	.665	.874	.....	.....
1022a	.4900	10		.157	.315	.472	.646	.016	.650	.866	1.220	.....
1022b	.4735	11		.165	.339	.492	.669	.016	.673	.866	1.142	.....
986a	.4597	20		.177	.343	.520	.709	.024	.709	.953	1.220	.....
642a	.5358	16		.181	.366	.551	.748	.016	.760	.992	1.260	.....
642b	.5398	16		.177	.366	.563	.764	.016	.776	1.012	1.299	1.685
523a	.3602	16		.197	.378	.591	.827	.039	.846	1.220	.....	.....
523b	.3523	16		.197	.394	.591	.866	.059	.874	1.319	.....	.....
523c	.3636	16		.197	.417	.610	.890	.043	.933	1.339	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1223		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	718	10.950	Fracture began at knot 1¼″ from middle. Fibers crushed. (Photograph.)
.....	.....	.....	.....	.....	.....	845	12.880	Fine splintering ″.4 deep. Fibers crushed 1″ deep. (Photograph.)
1.260	.....	.....	.....	.....	.....	890	13.570	Coarse splintering, ″.2 deep at middle corner. Fibers crushed ″.3 deep.
1.280	.....	.....	.....	.....	.....	940	14.330	Long, fine splintering ″.4 deep. Fibers crushed, ″.8 deep. (Photograph.)
1.102	.....	.....	.....	.....	.....	985	15.020	Long, fine splintering. Fibers crushed. Split along grain 18″.
1.220	.....	.....	.....	.....	.....	991	15.110	Short, splintering. Fibers crushed, ″.7 deep.
.....	.....	.....	.....	.....	.....	724	11.040	Irregular, brittle, nearly separating stick. Split along grain 8″.
.....	.....	.....	.....	.....	.....	658	10.030	Square, brittle, nearly separating stick at middle. (Photograph.)
.....	.....	.....	.....	.....	.....	847	12.910	Long, fine splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	655	9.990	Failed at knot ⅝″ diameter 5″ from middle.
.....	.....	.....	.....	.....	.....	675	10.290	Short, brittle, ″.8 deep. Fibers crushed. Split along grain 11″.
.....	.....	.....	.....	.....	.....	754	11.500	Square, brittle, separating stick at middle.
.....	.....	.....	.....	.....	.....	740	11.280	Brittle, splintering. Fibers crushed. Split along grain 8″.
.....	.....	.....	.....	.....	.....	737	11.240	Brittle, ″.4 deep. Oblique cracks along grain 20″.
.....	.....	.....	.....	.....	.....	856	13.050	Irregular, brittle, 1″ deep. Oblique fracture 5″ long, separating stick.
.....	.....	.....	.....	.....	.....	616	9.390	Square, brittle, ″.4 deep, splintering at one corner. Fibers crushed.
.....	.....	.....	.....	.....	.....	585	8.920	Irregular, brittle, 1″ deep. Fibers crushed.
.....	.....	.....	.....	.....	.....	605	9.220	Do.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	
			→	In.	In.	In.	In.	In.	In.	In.	In.	
377a	.4455	11		.260	.524	.827	.....	.....	.....	.....	.....	
377b	.4419	9		.228	.425	.661	.886	.020	.886	.....	.....	
449$_1$a	.3941	24		.248	.488	.768	1.142	.098	1.154	.....	.....	
449$_1$b	.3750	28		.248	.532	.846	.....	.....	.....	.....	.....	
449$_2$a	.3682	24		.220	.453	.658	.965	.059	1.008	1.543	.....	
449$_2$b	.3807	24		.283	.598	.....	.....	.....	.....	.....	.....	
820a	.3358	24		.284	.567	.866	1.260	.094	1.398	.....	.....	
820b	.3350	30		.256	.520	.827	.....	.....	.....	.....	.....	
820c	.3673	28		.244	.488	.807	1.260	.173	1.378	.....	.....	
820d	.3622	30		.197	.433	.669	.....	.....	.....	.....	.....	
1009	.4002	7		.252	.512	.....	.....	.....	.....	.....	.....	
1010a	.3596	7		.197	.354	.551	.807	.039	.815	.....	.....	
1010b	.3640	5		.197	.370	.571	.827	.063	.866	1.260	.....	
529a	.3602	7		.291	.551	.846	1.260	.098	1.358	.....	.....	
529b	.3801	8		.248	.488	.787	1.142	.079	1.181	.....	.....	
639a	.4019	9		.284	.587	.906	1.268	.075	1.315	1.760	2.520	
639b	.4744	9		.295	.571	.882	1.240	.087	1.280	1.721	2.500	
733a	.4989	12		.150	.291	.433	.587	.016	.591	.728	.921	1.1

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	420	6.400	Oblique, 18″ long, separating stick.
.....	.....	.....	.....	.....	.....	549	8.370	Long, oblique, beginning at corner 9″ from middle.
.....	.....	.....	.....	.....	.....	516	7.870	Coarse, splintering. Fibers crushed. 6 knots ¼″ to ⅜″ diameter.
.....	.....	.....	.....	.....	.....	349	5.320	Short, irregular, break at knot ½″ diameter at middle of stick.
.....	.....	.....	.....	.....	.....	551	8.400	Coarse, splintering. Fibers crushed. Split along grain 12″.
.....	.....	.....	.....	.....	.....	326	4.970	Oblique, 18″ long, separating stick. 10 knots ⅜″ to ½″ diameter. Cross-grained.
.....	.....	.....	.....	.....	.....	486	7.410	Square, brittle, middle of stick.
.....	.....	.....	.....	.....	.....	435	6.630	Square, brittle, middle of stick. Slight crushing.
.....	.....	.....	.....	.....	.....	464	7.070	Irregular, brittle, at middle. Oblique fracture 8″ long, separating stick at middle. Fibers crushed.
.....	.....	.....	.....	.....	.....	441	6.720	Long, oblique, beginning at corner 12″ from middle. Crack extending along grain 25″.
.....	.....	.....	.....	.....	.....	314	4.790	Split along neutral axis. Outside fibers uninjured.
.....	.....	.....	.....	.....	.....	496	7.560	Split along grain, beginning at corner 5½″ from middle. Fibers crushed at middle and 2½″ from middle.
.....	.....	.....	.....	.....	.....	585	8.920	Irregular, brittle. Fibers crushed. Long splinter tore off tension side from end to middle.
.....	.....	.....	.....	.....	2.047	524	7.990	Short, brittle. Fibers crushed. Irregular cracks along grain 24″.
.....	.....	.....	.....	.....	.....	470	7.170	Irregular, brittle, commencing at knot 1¼″ from middle. Eight knots ¼″ to ½″ diameter.
.....	.....	.....	.....	.....	.....	661	10.080	Coarse, splintering. Fibers crushed, knot at middle, 1½″ diameter.
.....	.....	.....	.....	.....	.....	718	10.950	Coarse, splintering. Fibers crushed, knot at middle, 1¾″ diameter. Split along grain 28″.
.....	.....	.....	.....	.....	.....	852	12.990	Coarse, splintering. ″.15 deep. Fibers crushed 1″ deep.

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	
			→	In.	In.	In.	In.	In.	In.	In	In.	
733b	.4504	12		.154	.291	.445	.591	.008	.630	.827	1.102	...
1004a	.4754	16		.157	.307	.472	.646	.024	.661	.866	1.280	...
1004b	.5168	24		.157	.303	.469	.638	.020	.654	.866	1.181	...
965a	.5074	8		.157	.299	.449	.606	.016	.630	.827	1.063	1.
965b	.4932	9		.157	.303	.461	.630	.016	.638	.858	1.142	1.
647a	.4608	7		.354	.748	1.209	1.811	.217	1.945	3.701	.....	...
647b	.5134	16		.197	.410	.618	.866	.039	.886	1.181	.....	...
647c	.4965	10		.354	.720	1.161	1.606	.157	1.713	2.441	.....	...
226$_2$a	.7382	20		.083	.197	.291	.394	.004	.402	.500	.630	.
226$_2$b	.7296	11		.126	.236	.362	.472	.008	.472	.591	.728	.
774	.6147	16		.157	.283	.425	.571	.032	.575	.709	.925	1.
774	.6337	22		.138	.260	.394	.520	.016	.532	.650	.984	...
781a	.5974	18		.276	.524	.827	1.169	.110	1.201	1.591	2.185	...
781b	.5742	20		.284	.559	.882	1.260	.114	1.291	1.732	2.500	...
786a	.5964	17		.134	.276	.433	.571	.020	.575	.717	.933	1.
786b	.6204	18		.150	.283	.425	.571	.016	.579	.728	.921	1.
795a	.6170	14		.130	.268	.394	.520	.012	.532	.669	.846	1.
795b	.6030	13		.126	.276	.406	.551	.016	.571	.740	.953	1.

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	750	11.440	Short splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	723	11.020	Short, brittle, nearly separating stick at middle.
.....	.....	.....	.....	.....	.....	768	11.720	Brittle, splintering. Fibers crushed.
.....	.....	.....	.....	.....	.....	851	12.980	Splintering ".2 deep. Fibers crushed.
.....	.....	.....	.....	.....	.....	772	11.760	Brittle and splintering ".2 deep. Fibers crushed.
.....	.....	.....	.....	.....	3.701	551	8.400	Square, brittle at middle. Split along grain 30".
.....	.....	.....	.....	.....	.....	768	11.710	Oblique, 15" long, separating stick. Cross-grained.
.....	.....	.....	.....	.....	.....	661	10.080	Square, brittle, ".7 deep. Oblique fracture, detached triangular piece 11" long, compression side.
.945	1.142	.....	.....	.....	1.890	1,100	16.770	Fine splintering. Fibers crushed. Ten knots, ".15 to ".20 diameter.
1.142	1.496	.....	.....	.....	1.969	992	15.110	Coarse splintering. Fibers crushed. Stick free from knots.
1.811	.....	.....	.....	.....	1.811	882	13.430	Long, fine splintering. Fibers crushed ".8 deep.
.....	.....	.....	.....	.....	.....	744	11.350	Coarse splintering. Fibers crushed at middle and at knots 4" from middle.
.....	.....	.....	.....	.....	2.185	661	10.080	Short, brittle, ".2 deep. Oblique cracks along grain, extending to end of stick.
.....	.....	.....	.....	.....	.....	674	10.280	Short, brittle, ".5 deep. Oblique fracture, 10" long, separating stick. Piece 10" long detached tension side.
.....	.....	.....	.....	.....	.....	868	13.240	Fine splintering. Fibers crushed ".9 deep.
1.417	1.811	.....	.....	.....	.....	1,002	15.280	Irregular, brittle, 1" deep. Fibers crushed.
1.575	.....	.....	.....	.....	.....	882	13.450	Coarse splintering, ".5 deep. Fibers crushed ".8 deep.
.....	.....	.....	.....	.....	.....	818	12.470	Splintered at middle. Crack extending 15" towards end. Fibers crushed

TABLE 1.—TRANSVERSE TESTS—Continued.

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—								
				110	220	331	441	0	441	551	661	772
			→	In.	In.	In.	In.	In.	In.	In.	In.	In.
840a	.5989	7		.228	.441	.717	1.035	.118	1.063	1.378	1.929	.....
840b	.6278	10		.236	.457	.701	1.012	.079	1.043	1.398	1.850	2.953
719a	.6256	10		.157	.315	.472	.638	.020	.650	.827	1.083	1.41
719b	.6966	11		.142	.276	.413	.551	.016	.551	.709	.886	1.10
984a	.8137	18		.118	.224	.331	.433	.012	.449	.551	.689	.81
984b	.8364	20		.118	.224	.323	.433	.008	.433	.535	.650	.76
1006a	.8426	16		.102	.197	.299	.410	.008	.410	.512	.630	.74
1006b	.8376	14		.098	.197	.295	.394	.008	.394	.496	.610	.72
1159a	.6011	.....		.417	.953	.....	.....	.....	.....	.....	.....	.....
1159b	.6307	.....		.276	.532	.787	1.158	.071	1.319	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—Continued.

DEFLECTIONS FOR LOADS IN POUNDS OF—					Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
882	992	1102	1213	1323		Total pounds.	Modulus of rupture.	
In.	*In.*	*In.*	*In.*	*In.*	*In.*			
.....	.....	.....	.....	.....	.....	771	11.760	Brittle at corner, splitting along grain 20″, intersecting "Cooper" lines developed on sides.
.....	.....	.....	.....	.....	.....	774	11.800	Irregular, brittle, ".7 deep. Split along grain 12″, intersecting "Cooper" lines developed on sides.
.....	.....	.....	.....	.....	.....	860	13.110	Long, coarse splintering. Fibers crushed.
1.339	1.772	.....	.....	.....	.....	1,049	15.860	Fine splintering. Fibers crushed.
.972	1.122	1.406	1.874	.....	.....	1,213	18.480	Long, fine splintering. Fibers crushed.
.906	1.055	1.260	1.487	1.791	.....	1,393	21.240	Long, coarse splintering. Fibers crushed. (Photograph.)
.894	1.071	1.339	.....	.....	.....	1,210	18.450	Coarse splintering. Fibers crushed.
.866	1.043	.....	.....	.....	.....	1,210	18.450	Coarse splintering began at corner 4½″ from middle at knot, ".3 diameter. Fibers crushed.
.....	.....	.....	.....	.....	.....	257	3.920	Oblique ragged fractures.
.....	.....	.....	.....	.....	.....	441	6.720	Oblique ragged fractures. (Photograph.)

TABLE 1.—TRANSVERSE TESTS—LARGE SPECIMENS.

[Dimensions, 3″.15 by 3″.15.]

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—									
				882	1764	2646	3527	0	3527	4409	5291	6173	7055
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
346	.7348	7		.079	.161	.252	.350	.008	.354	.441	.594	.768	1.024
354	.5262	.....		.087	.169	.272	.374	.012	.374	.488	.638	.....	.....
307	.7838	8		.087	.173	.260	.362	.016	.362	.480	.630	.....	.....
1248	.8476	7		.079	.157	.240	.315	0	.319	.402	.496	.598	.756
546	.6537	{About 16}		.114	.205	.303	.417	.028	.421	.559	.760	1.024	.....
364	.8198	10		.087	.157	.236	.323	.012	.323	.402	.512	.650	.811
38x	.4783	8		.098	.201	.307	.433	.012	.433	.610	.....	.....	.....
38y	.4757	5		.110	.205	.311	.433	.016	.433	.618	1.165	.....	.....
19	.7534	7		.091	.177	.268	.366	.008	.370	.472	.598	.728	.984
306	.7491	4		.114	.217	.339	.480	.032	.484	.669	.913	1.299	.....
951	.7108	2		.102	.197	.295	.386	.016	.394	.492	.610	.768	.....
362	.7739	6		.098	.197	.291	.402	.197	.406	.535	.717	.961	1.417
8x	.6958	12		.098	.....	.....	.....	.....	.....	.....	.756	1.075	.....
8y	.6820	8		.122	.252	.394	.583	.047	.591	.827	.....	.....	.....
524x	.8107	12		.126	.248	.394	.551	.059	.571	.768	1.043	1.535	.....
524y	.5888	12		.126	.240	.366	.516	.051	.524	.709	.953	1.299	1.929
925	.8158	18		.098	.177	.276	.374	.....	.....	.....	.....	.....	.....

TABLE 1.—TRANSVERSE TESTS—LARGE SPECIMENS.

[Dimensions, 3″.15 by 3″.15.]

Maximum deflection.	ULTIMATE STRENGTH.		Description of fracture.
	Total pounds.	Modulus of rupture.	
In.			
	7,330	13.970	Brittle splintering, ¼″ deep.
	6,140	11.700	Splintering fracture, 1″ deep.
	6,400	12.200	Coarse splintering.
	8,800	16.770	Fine splintering. Fibers crushed.
	7,020	13.380	Fine splintering, 1¼″ deep.
	8,818	16.810	Coarse splintering.
142	5,205	9.920	Split along rings from end to middle. Fibers crushed. (Photograph.)
165	5,291	10.080	Splintering at one corner. Fibers crushed.
	8,410	16.030	Fine splintering. Fibers crushed. (Photograph.)
	6,890	13.130	Coarse splintering, beginning at corner.
	7,040	13.420	Coarse splintering, taking oblique direction from tension side.
	7,210	13.740	Coarse splintering.
	6,704	12.770	Brittle splintering, 1¼″ deep.
	4,950	9.430	Irregular, brittle, 1¼″ deep.
	6,650	12.670	Fine splintering, half-way across face. Season cracked.
	7,480	14.260	Fine splintering, half-way across face. Slight crushing. (Photograph)
	4,380	8.350	Coarse splinters. Split along rings from middle to end. (Photograph).

TABLE 1.—TRANSVERSE TESTS—LARGE SPECIMENS—Continued.

[Dimensions, 3″.15 by 3″.15.]

Mark on specimen.	Specific gravity.	Rings per inch.	Direction of loading.	DEFLECTIONS FOR LOADS IN POUNDS OF—									
				882	1764	2646	3527	0	3527	4409	5291	6173	7055
			→	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
963	.7626	24		.157	.307	.472	.681	.055	.689	.945	1.598	.....	.....
349	.7253	4		.079	.138	.217	.291	.008	.287	.366	.465	.....	.....
991	.5381	12		.126	.264	.421	.630	.079	.....	.....	.....	.....	.....
350	.3719	4		.268	.528	.827	.....	.....	.....	.....	.....	.....	.....
82*x*	.5310	5		.091	.181	.284	.378	.008	.382	.496	.669	.....	.....
82*y*	.5801	5		.079	.150	.220	.295	.008	.299	.394	.472	.846	.....
83*x*	.7614	8		.106	.205	.315	.417	.016	.433	.535	.681	.866	.....
83*y*	.8271	7		.118	.244	.374	.512	.035	.528	.709	.906	1.181	.....
81	.8609	25		.075	.134	.201	.268	0	.276	.343	.413	.492	.575
85	.5092	9		.083	.177	.276	.382	.012	.390	.496	.646	.807	1.083
243*x*	.6788	14		.079	.157	.232	.307	0	.311	.394	.480	.....	.....
243*y*	.6193	18		.087	.165	.236	.315	.016	.315	.386	.472	.630	.925
84	.7633	20		.091	.165	.236	.315	.016	.315	.402	.496	.610	.768

TABLE 1.—TRANSVERSE TESTS—LARGE SPECIMENS—Continued.

[Dimensions, 3″.15 by 3″.15.]

Maximum deflection.	ULTIMATE STRENGTH. Total pounds.	ULTIMATE STRENGTH. Modulus of rupture.	Description of fracture.
In.			
1.540		10.560	Long oblique, beginning at corner and splitting along grain.
3.610		16.410	Coarse splintering. Fibers crushed.
2.945		7.520	Coarse oblique splintering, beginning at corner, 10″ from middle.
2.830		5.390	Square break, 1½″ deep. Split along grain. Oblique fracture, 5″ long, separating stick.
5.960		11.360	Coarse splintering, 2″ deep. Crushed at middle bearing.
6.173		11.770	Split along rings from middle to end. Crushed at middle bearing. (Photograph.)
7.020		13.380	Coarse splintering at one corner.
6.800		12.960	Fracture began at corner, 5″ from middle, extending along grain.
7.950		15.150	Short brittle, 1½″ deep. Slight crushing. (Photograph).
7.070		13.480	Irregular, brittle, 2½″ deep. Split along grain. Fibers crushed.
6.170		11.760	Coarse splintering, beginning at corners.
7.140		13.610	Short brittle, 1 1/16″ deep. Fibers crushed.
7.746		14.760	Split along rings from end to middle of stick. (Photograph.)

COMPRESSION TESTS.

[Description of and details of results in Table 2.]

Dimensions of specimens.

1″.575 by 1″.575 by 12″.60 long.

The sticks were compressed parallel to the direction of the gra between flat steel platforms.

Loads were gradually applied till the maximum resistance was det mined.

The time of making a test averaged 6 minutes.

The specimens were identified by numbers, in the same manner t transverse sticks were identified, all sticks from the same tree bei given the same number.

In the preparation of these specimens some were cut from sticks the standard length 43″.30, and duplicate specimens were secured fr the same stick which had not previously been tested. In many cas compression specimens were cut from the ends of sticks which had be tested by transverse stress, using such portions as did not show e dences of injury by the first test. When such a stick was tested compression the fact is made known by retaining the letter of the tra verse stick in connection with the distinguishing number of the spe men.

All specimens which have the same number and letter came from same standard stick 43″.30 long. Sticks of the same number but ferent letter came from the same tree, but from different parts of not from the same standard stick. Where a stick appears numbe only, it was not identified further than belonging to a certain tree.

The variation in strength, observed in specimens from the same tr make a complete identification desirable, that the relation in streng for the different kinds of loads might be established. The specime as received for testing were not provided, except in a few cases, w marks whereby this was made known; it was therefore necessary match the specimens by means of the grain and as far as possible s ply this data.

The compression specimens did not in every case have their e squared off perpendicular to their axes. In the column headed "c dition of bearings" is shown whether the ends took an even bearing the testing-machine, and if not what the amount of opening was at short side of the stick.

Notwithstanding the eccentricity of loading occasioned by imperf ends, the manner of failure in many cases did not appear to have b influenced by it—another illustration of the want of homogeneity these specimens. Straight-grained and sound sticks failed by crush the fibers with or without flexure of the specimen. When the st crushed without flexure the line of failure extended across the faces the specimen in direct or irregular lines, at angles from 40 degrees 90 degrees with the axis of the specimen. Those which took a tri flexure did not deflect at the middle, according to apparent law, some cases deflecting concave on the heart side, in other cases conv on that side; some deflected diagonally, as shown by the end views a arrows opposite the results.

Neither was the maximum deflection always at the center of the sti An eccentricity of this kind of 2″ was noted.

Intersecting ("Cooper") lines of failure were observed on the faces those which failed by flexure, the same in appearance as noted on t mpression faces of transverse sticks.

Specimens containing knots generally failed in their vicinity, the distortion of the fibers occasioning weakness even if the knot be a sound one.

TABLE 2.—COMPRESSION TESTS.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength. Total pounds.	Ultimate strength. Pounds per square inch.	Manner of failure.
346	.....	Inch.			
346e	.....	.02	16,210	6,540	Crushed fibers at ⅜″ knot, 5″ from end.
354	.....	.02	17,760	7,160	Triple flexure.
354	.....	Even.	15,900	6,410	Fibers crushed 2″ from end.
240b	.....	.01	14,040	5,660	Fibers crushed at middle.
240a	.....	Even.	14,510	5,850	Triple flexure.
261g	.....	...do..	14,980	6,040	Fibers crushed 3″ from end.
261e	18	...do..	11,300	4,560	Crushed fibers 2½″ from end.
534b	18	...do..	12,220	4,950	Crushed in vicinity of knots at middle.
534	8	...do..	18,370	7,410	Crushed fibers 4″ from end and on opposite side at end.
1178e	8	...do..	16,290	6,570	Crushed fibers 3″ from end.
1178	9	...do..	14,390	5,800	Crushed fibers in vicinity of knots 2¼″ from end.
532	9	...do..	14,500	5,850	Crushed fibers 1½″ from middle.
532	12	...do..	16,220	6,540	Opened crack along grain between rings.
266i	12	.02	18,300	7,380	Crushed fibers 2½″ from end.
266h	10	Even.	12,450	5,020	Crushed fibers 5″ from end.
266g	8	...do..	13,390	5,400	Triple flexure, intersecting "Cooper" lines developed.
266f	12	.02	16,700	6,730	Fibers crushed 2″ and 5″ from end.
266e	20	Even.	12,800	5,160	Failed at ¼″ knot 2″ from end.
138	24	...do..	10,550	4,250	Fibers crushed 3″ from end.
395	20	...do..	10,280	4,150	Failed at knot at middle.
1231a	4	...do..	14,360	5,790	Fibers crushed 2½″ from end.
1231c	6	...do..	13,600	5,480	Fibers crushed at middle.
1232a	.....	.01	12,950	5,220	Fibers crushed vicinity of knot 2″ from end.
1232c	.....	Even.	13,900	5,600	Fibers crushed at middle.
1236e	22	...do..	12,100	4,880	Fibers crushed 2½″ from end.
1236a	22	.02	12,360	4,980	Do.
818b	13	Even.	14,630	5,900	Fibers crushed 5″ from end.
818a	12	.02	13,980	5,640	Fibers crushed 2″ from end.
211e	18	Even.	7,500	3,020	Fibers crushed 4½″ from end.
211c	18	...do..	7,470	3,010	Crushed at knot 2½″ from end.
479e	.....	...do..	10,340	4,170	Crushed fibers 2½″ from end.
479c	.....	...do..	10,950	4,420	Crushed at middle one side.
1131a	.....	...do..	28,100	11,330	Crushed at middle and split along grain.
1131b	.....	...do..	27,100	10,930	Crushed near middle. Convex heart side.
226a	12	...do..	12,880	5,190	Crushed at knots near end.
226b	12	...do..	12,680	5,110	Crushed at knots ⅜″ diameter, 2½″ and 5″ from end.
414a	7	...do..	14,970	6,040	Crushed fibers 2½″ from end.
414b	7	...do..	14,100	5,690	Crushed fibers at ⅜″-knot near end.
2	.....	...do..	9,450	3,810	Crushed fibers ¾″ and 4″ from end.
1039b	5	...do..	11,200	4,520	Crushed fibers 3″ from end.
1039c	6	.02	9,980	4,020	Triple flexure.
252a	10	Even.	15,800	6,370	Crushed fibers 4½″ from end, deflecting stick.
252b	10	...do..	15,950	6,480	Crushed fibers 1¾″ from end.
316	15	...do..	13,920	5,610	Crushed fibers 2″ from end.
124e	15	...do..	10,900	4,400	Crushed fibers 5″ from end, one side.
745c	13	...do..	13,900	5,600	Crushed fibers 1½″ from end.
745e	13	...do..	14,700	5,930	Crushed fibers 5″ from end.
285i	8	...do..	10,840	4,370	Crushed fibers 4″ from end.
285g	11	...do..	12,230	4,930	Crushed fibers 2″ from end.
285a	11	...do..	11,300	4,560	Crushed fibers 6″ from end.
320a	15	...do..	16,900	6,810	Crushed fibers at middle.
320b	14	...do..	18,250	7,360	Crushed fibers 4½″ from end.
1113a	.....	.02	13,800	5,560	Crushed fibers near middle vicinity of small knots.
476	30	.02	26,300	10,600	Split along grain. Stick warped before test.
1138	30	.01	25,680	10,350	Crushed fibers and split along grain near end.
735a	5	Even.	16,970	6,840	Crushed at middle. Concave on heart side.
735	5	...do..	16,250	6,550	Triple flexure, intersecting "Cooper" lines.
1086e	.....	.01	13,180	5,310	Crushed fibers at knot ¼″ diameter.
1086	.....	Even.	16,990	6,850	Crushed fibers 5″ from end.
1140b	40	...do..	24,600	9,920	Brittle crushing of fibers. Splintered along grain.
1140e	40	...do..	23,700	9,560	Fractured suddenly. Splintered along grain. Fragments flew. Shattered.
487e	.....	...do..	16,100	6,490	Crushed fibers at middle.
487c	.....	.03	13,950	5,625	Split from end to end along grain.
462a	.....	Even.	5,180	2,080	Crushed fibers and failed in vicinity of knot.
462b	.....	...do..	5,720	2,310	Crushed fibers 1½″ from end.
475e	.....	.01	26,400	10,650	Split along grain.
452a	.....	.02	22,300	8,990	Failed at ¼″ knot 3″ from end.
452	.....	.02	24,700	9,900	Crushed fibers 3½″ from end. Fragment flew off suddenly.
280b	.....	Even.	16,180	6,520	Triple flexure. Knot near end.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
280*b*	.....	Even.	13,400	5,400	Failed at knot 2½" from end.
484*a*	.....	...do..	12,460	5,020	Failed vicinity of knots 3" from end.
484	.....	.01	12,150	4,900	Crushed fibers 4½" from end.
338	7	Even.	13,600	5,480	Crushed fibers at end and 2½" from end.
338	7	...do.	12,580	5,070	Crushed fibers 5" from end. Grain wavy. Triple fle
454*a*	About 50	.02	29,600	11,940	Split along grain.
460*a*	.....	.01	27,350	11,030	Crushed fibers 2½" from end.
460*b*	.....	Even.	29,300	11,830	Crushed fibers at knots and split along grain.
303	7	...do..	15,680	6,320	Crushed fibers 5½" from end.
993*a*	13	...do..	21,900	8,830	Crushed fibers near middle.
297*a*	.....	...do..	9,990	4,030	Crushed fibers 3" and 4" from end. Split along grai
297	26	...do..	10,990	4,430	Crushed fibers near middle. Grain wavy.
386	.....	...do..	11,780	4,750	Crushed fibers ¾" from end.
386	.....	...do..	11,480	4,630	Crushed fibers 5" from end.
684*e*	9	...do..	11,120	4,480	Crushed fibers at middle vicinity of knot.
684	7	.01	13,950	5,625	Crushed fibers 2" from end.
944*e*	5	Even.	13,900	5,600	Crushed fibers at knot 2" from end.
307*e*	16	...do..	17,200	6,940	Crushed fibers near middle.
307*e*	16	...do..	19,050	7,680	Triple flexure, intersecting "Cooper" lines at middl
928	16	...do..	15,900	6,410	Triple flexure. Sprung about ⅜" concave, without ing fibers.
928	18	...do..	14,190	5,720	Triple flexure. Split along grain.
463*a*	.....	...do..	22,900	9,230	Crushed fibers 4" from end.
463*b*	.....	...do..	24,100	9,720	Triple flexure. Split along grain.
464	.....	...do..	15,150	6,110	Deflected and split along grain.
464	.....	...do..	15,800	6,370	Triple flexure.
982*b*	.....	...do..	14,420	5,810	Crushed fibers at knot 3" from end.
982*b*	.....	...do..	14,150	5,710	Triple flexure. Knot near end.
1023*a*	.....	...do..	13,050	5,260	Crushed fibers near middle and end.
1023*b*	.....	...do..	12,170	4,910	Crushed fibers 1" and 3" from end.
1014*a*	16	...do..	16,200	6,530	Crushed fibers at knot at middle.
376*e*	10	...do..	18,500	7,460	Crushed fibers 3" from end.
409*a*	25	...do..	19,980	8,060	Crushed fibers 1" from end.
298*e*	14	...do..	24,100	9,720	Crushed fibers near middle and 1" from end.
299*a*	16	...do..	24,650	9,940	Crushed fibers 5" from end.
1233*a*	16	.01	24,250	9,780	Crushed fibers 1½" from end at ¼" knot.
1233*b*	20	Even..	21,980	8,860	Crushed fibers at end. Grain oblique.
1234*a*	16	...do..	21,950	8,850	Crushed fibers at end.
1234*b*	16	.01	21,400	8,630	Crushed fibers 1" from end.
1235*a*	18	.01	19,600	7,900	Crushed fibers 3" from end. Stick split 3" during verse test.
1235*b*	16	.01	21,980	8,860	Crushed fibers at end.
213	.....	Even..	19,600	7,900	Crushed fibers at ⅜" knot 2" from end.
274*ae*	12	.01	22,200	8,950	Crushed fibers 3" from end.
1167	18	Even..	20,550	8,290	Crushed fibers at middle. "Cooper" lines.
1167	14	...do..	20,700	8,350	Triple flexure. "Cooper" lines.
757	5	...do..	15,200	6,130	Crushed fibers at knot 4" from end.
757*a*	10	.02	18,020	7,270	Triple flexure, intersecting "Cooper" lines.
1052*a*	20	Even..	17,000	6,850	Crushed fibers 2" and 3" from end at knots.
743*e*	16	...do..	15,950	6,430	Crushed fibers near middle.
743	16	...do..	14,900	6,010	Crushed fibers at middle and end.
530*e*	7	...do..	18,600	7,500	Crushed fibers 1" from end.
530	7	...do..	16,100	6,490	Crushed fibers 3½" from end.
20	6	...do..	16,950	6,830	Crushed fibers near middle. "Cooper" lines.
878*e*	.....	.02	15,350	6,190	Triple flexure. "Cooper" lines.
878*e*	8	.01	16,270	6,560	Triple flexure. "Cooper" lines. Middle bend 4½" fro
1048	12	Even..	15,500	6,250	Crushed fibers 3½" from end.
1048	11	...do..	16,250	6,550	Crushed fibers 1" and 4" from end.
311	3	...do..	11,350	4,570	Crushed fibers 1" from middle.
311	3	...do..	11,200	4,520	Crushed fibers at middle.
290*a*	14	.02	11,200	4,520	Crushed fibers 3" from end.
290*b*	11	.01	11,680	4,710	Crushed fibers near middle and split along grain.
645*e*	3½	Even.	14,580	5,880	Crushed fibers at knot near middle.
645*e*	4	...do..	16,600	6,690	Crushed fibers 1½" from middle.
736	7	...do..	13,300	5,360	Crushed fibers at knot 3" from end.
330*e*	12	...do..	16,900	6,810	Crushed fibers 3½" from end at ¼" knot.
405*e*	4	.01	28,650	11,550	Crushed fibers near end and split along grain.
405	4	Even.	29,600	11,940	Crushed fibers at end and 3" from end.
1247*a*	9	.01	21,900	8,830	Crushed fibers vicinity of small knot.
1247*b*	9	Even.	24,900	10,040	Crushed fibers vicinity of small knot 4" from end.
1248*a*	9	...do..	22,650	9,130	Crushed fibers at end.
1248*b*	8	.02	26,100	10,520	Do.
441*e*	4	Even.	22,550	9,090	Crushed fibers, ⅜" knot 2" from end.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
815*a*	16	.01	18,250	7,360	Triple flexure.
815	16	Even.	27,550	11,110	Crushed fibers vicinity of knots at middle.
1031*a*	8	.01	24,100	9,720	Crushed fibers 2″ from end.
650*e*	.....	Even.	12,900	5,200	Split along grain. Oblique fractures.
564*e*	.....	...do..	21,050	8,490	Shattered one end. Cross-grained.
33*a*	9	...do..	21,900	8,830	Crushed near middle and at end.
439	6	...do..	15,800	6,370	Crushed at end and 4″ from end.
	About				
329*a*	30	.01	17,050	6,875	Split along grain from end to end.
932*a*	16	Even.	23,200	9,350	Took reversed bend near middle.
296	15	...do..	20,300	8,190	Crushed ¼″ and 4½″ from end.
519*a*	10	.01	13,600	5,480	Crushed and split along grain, vicinity of knots.
1241*a*	13	Even.	12,950	5,220	Crushed 3½″ from end.
1242*a*	15	...do..	11,980	4,830	Crushed at end and 4″ from end.
1243*a*	18	...do..	11,780	4,750	Triple flexure.
53*a*	10	.01	17,000	6,850	Crushed 3″ from end.
53*b*	9	Even.	17,900	7,220	Triple flexure.
444*a*	9	...do..	18,020	7,270	Do.
760*e*	9	...do..	21,800	8,790	Crushed 3½″ from end at ⅜″ knot.
760	9	...do..	19,400	7,820	Crushed at middle at ⅞″ knot.
678*a*	8	...do..	13,400	5,400	Crushed at ½″ knot at middle.
678*b*	6	...do..	16,050	6,470	Crushed 2½″ from end.
436*a*	7	.01	17,900	7,220	Crushed at knot near middle.
1089*a*	10	.02	18,450	7,440	Crushed near middle.
1090*a*	8	Even.	14,780	5,960	Crushed at knot 4″ from end.
1091*a*	10	...do..	15,100	6,090	Crushed at middle, vicinity of knots.
927	.....	...do..	16,450	6,630	Crushed near middle. Opened cracks along grain. Split before test.
680	.....	.01	21,900	8,830	Split along grain from end to end. Crushed near middle.
680	.....	Even.	23,900	9,640	Triple flexure.
658*a*	3	...do..	22,120	8,920	Crushed at ½″ knot at middle.
658*b*	.....	...do..	25,200	10,160	Crushed near end. Cross-grained.
697*a*	12	...do..	26,200	11,560	Split obliquely along grain from end to end.
509*e*	.....	...do..	15,550	6,270	Crushed near middle.
1112*e*	.....	.02	18,380	7,410	Crushed at ⅜″ knot 4″ from end.
68*a*	.....	.01	19,100	7,700	Crushed 1″ from end, vicinity of small knots.
68*b*	.....	Even.	19,400	7,820	Crushed ¾″ and 3½″ from end.
334*a*	.....	...do..	23,800	9,600	Crushed 4″ from end and at end.
425*a*	.....	.01	14,200	5,720	Crushed at ½″ knots near end.
233*e*	6	Even.	14,400	5,810	Crushed at ½″ knot 4″ from end.
233*e*	6	.01	14,300	5,770	Crushed at 4″ from end.
606*e*	.....	.02	17,550	7,080	Split at end. Cross-grained.
968*b*	6	.01	14,690	5,920	Crushed at ½″ knot 1″ from end.
968	6	Even.	17,750	7,160	Crushed fibers near middle.
15*b*	10	.02	22,350	9,010	Failed at knot at end and split along grain.
15*b*	9	.02	22,610	9,120	Triple flexure.
1053	9	Even.	17,700	7,140	Crushed fibers near middle one side of stick.
1053	9	...do..	18,980	7,650	Triple flexure.
368*a*	15	...do..	20,050	8,080	Crushed at middle.
400*a*	17	...do..	14,470	5,830	Crushed at end and split obliquely along grain.
115*a*	22	...do..	15,950	6,430	Crushed at middle at ½″ knot.
115	10	...do..	19,250	7,760	Crushed 1½″ from end.
317*a*	20	...do..	17,200	6,940	Crushed at end.
317*b*	.....	...do..	18,350	7,400	Crushed 5″ from end.
127	6	...do..	22,000	8,870	Crushed 1″ from middle.
127	6	...do..	19,600	7,900	Triple flexure.
148	6	...do..	20,280	8,180	Crushed near middle and at end.
763	10	.01	19,340	7,800	Crushed 2″ from end and split obliquely along grain.
763	12	.02	21,100	8,510	Crushed fibers 1½″ from end.
418*e*	.....	Even.	18,980	7,650	Split along grain from end to end.
937*a*	.....	.02	18,000	7,260	Crushed at middle at ½″ knot.
1032*e*	.....	.01	17,300	6,940	Crushed near middle at small knots.
1062*b*	.....	.01	21,200	8,550	Shattered at end. Cross-grained.
1062*e*	14	.01	20,950	8,450	Crushed at ⅝″ knot 4″ from end.
1158*e*	.....	Even	19,200	7,740	Crushed at end at 7/16″ knot.
883*e*	.....	...do..	23,100	9,310	Flew into ten pieces. Cross-grained.
908	.....	...do..	16,500	6,650	Triple flexure.
908*e*	.....	...do..	17,100	6,900	Crushed at ½″ knot 5″ from end.
1087*b*	7	...do..	15,300	6,170	Crushed 3″ from end, vicinity of 3/16″ knot.
1087*b*	.....	...do..	12,900	5,200	Crushed at ⅜″ knot 1″ from end.
1088*a*	10	.01	13,950	5,625	Crushed at two ½″ knots 3″ from end.
1088*b*	8	.01	12,950	5,220	Crushed 4″ from end. Cross-grained.
214*e*	7	Even.	13,900	5,600	Crushed at middle at ½″ knots.
365	.....	...do..	12,900	5,200	Crushed at ½″ knot 4″ from end.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
	Inch.				
410*a*	7	Even.	13,500	5,440	Triple flexure.
363*e*	.....	...do ..	14,710	5,930	Crushed at ⅜" knots 1¼" and 3" from end.
607*a*	8	...do ..	18,400	7,420	Crushed at middle at 1/10" knot.
607*b*	.....	...do ..	19,600	7,900	Crushed 4" from end.
328*e*	7	...do ..	12,800	5,160	Shattered at end.
328*f*	6	...do ..	13,300	5,360	Crushed 2½" from end.
1093*a*	.....	...do ..	16,200	6,530	Triple flexure. Small knots.
1093*b*	16	...do ..	18,400	7,420	Crushed 5" from end and split along grain.
949	.....	...do ..	18,970	7,650	Crushed ¾" from end and along one face.
1081*b*	7	...do ..	19,000	7,660	Crushed at middle at ½" knot and near end at ⅜" knot.
426*a*	.....	...do ..	16,400	6,610	Crushed at each end and middle.
426*a*	.....	.02	14,980	6,040	Crushed at middle at ½" knot.
926*a*	9	Even.	16,050	6,470	Crushed at ½" knot 4" from end.
289*a*	.....	...do ..	15,700	6,330	Crushed at middle on one corner.
767*a*	.....	.01	18,600	7,500	Crushed along one corner, concave on crushed side.
156	.....	Even.	16,400	6,610	Crushed near end.
241*a*	26	.02	24,900	10,040	Crushed 4½" from end.
849*b*	15	.02	22,950	9,250	Crushed 1" from middle. Sap.
849*e*	15	Even.	23,000	9,270	Triple flexure. Sap.
546*e*	14	...do ..	14,980	6,040	Crushed near middle.
546*e*	14	...do ..	14,300	5,770	Triple flexure.
1095*e*	.....	...do ..	17,300	6,980	Crushed 1" and 4" from end.
1095*e*	.....	...do ..	17,400	7,020	Crushed 2" from end.
1173*a*	.....	...do ..	13,970	5,630	Crushed 2½" from end and at middle on opposite faces
1173*e*	10	...do ..	14,100	5,690	Crushed and split at end. Cross-grained.
1181*e*	18	...do ..	17,350	7,000	Crushed 2½" from end.
1181	.....	.01	15,300	6,170	Do.
1182	.....	Even.	18,900	7,620	Crushed at middle.
1182	.....	.01	18,100	7,300	Do.
1183*e*	20	.01	18,200	7,340	Do.
1183*f*	.....	.01	17,500	7,060	Crushed 1" from middle.
485*b*	.....	.01	29,800	12,020	Crushed at end vicinity of knot.
485	.....	Even.	30,900	12,460	Crushed at middle. Cross-grained.
489*b*	.....	.01	21,195	8,540	Triple flexure.
489	.....	Even.	21,100	8,510	Crushed 1½" from end. Worm-eaten.
507*a*	.....	.01	15,900	6,410	Crushed near middle. Cross-grained and worm-eaten
507*b*	.....	Even.	15,800	6,370	Crushed 3" from end. Small knots.
1118*a*	.....	...do ..	31,300	12,620	Crushed 5" from end.
1135*e*	.....	.02	19,300	7,780	Split along grain. Opening season-cracks.
1135*e*	.....	Even.	19,700	7,940	Split along grain and crushed near end.
1127	.....	...do ..	24,100	9,720	Triple flexure. Intersecting "Cooper" lines develope
1127	.....	.01	23,300	9,400	Do.
67*a*	15	Even.	20,450	8,250	Triple flexure. Opened cracks at ends.
67*b*	15	.01	21,100	8,510	Do.
1077*a*	18	.02	19,850	8,000	Triple flexure. Split at ends along grain.
1077*b*	18	.02	19,800	7,980	Triple flexure. Split at ends. Intersecting "Coop lines.
1092*a*	13	.01	18,100	7,300	Triple flexure. Split at ends.
761*a*	.....	Even.	15,500	6,250	Crushed 4" from end. Cross-grained.
812*a*	28	Even.	19,250	7,760	Triple flexure intersecting "Cooper" lines. Sap.
812*b*	.....	...do ..	16,800	6,770	Triple flexure intersecting "Cooper" lines. Split al grain at ends.
960*a*	19	.01	22,900	9,230	Crushed at middle.
960*b*	19	.02	23,850	9,620	Crushed 4" from end.
605*a*	.....	Even.	15,200	6,130	Crushed 4½" from end. Split along grain.
813*e*	.....	...do ..	18,550	7,480	Crushed near middle. Split along one corner.
813*e*	.....	...do ..	18,100	7,300	Crushed 4" from end.
750	12	.01	17,400	7,020	Triple flexure. Split at ends.
750	12	.02	17,900	7,220	Crushed at ½" knots at middle.
833*e*	.....	Even.	18,100	7,300	Triple flexure. Split at ends.
833*e*	.....	.01	16,950	6,830	Crushed at knots 2½" from end.
834*e*	.....	Even.	14,500	5,850	Crushed at ¼" knot, 1" from middle.
834	.....	...do ..	16,300	6,570	Triple flexure. Split at ends.
835	.....	...do ..	15,480	6,240	Triple flexure. Deflected diagonally. Split at ends.
835	.....	...do ..	15,820	6,380	Triple flexure. Split at ends, intersecting "Cooper" li
517*a*	.....	.02	16,200	6,530	Crushed on one face 1" from middle.
128*e*	5	Even.	14,100	5,690	Crushed ½" and 5" from end on opposite sides.
128*e*	5	.01	13,950	5,625	Triple flexure. Split at ends.
550	.....	.....	12,600	5,080	Triple flexure.
550	.....	Even.	11,100	4,480	Crushed near middle.
604	.....	...do ..	13,500	5,440	Triple flexure, middle bend 5" from end.
604	.....	...do ..	12,100	4,880	Triple flexure, middle bend ½" from middle.
681*a*	.....	do ..	9,700	3,910	Shattered at end at ⅜" knot.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
370	.....	.01	19,600	7,900	Crushed near middle. Grain wavy.
110a	.....	Even.	22,400	9,030	Crushed at ends vicinity of knots. Split along grain.
110a	.....	.02	22,770	9,180	Crushed 1½" from middle.
739a	.....	.02	17,500	7,060	Crushed 1" from middle. Cross-grained.
466a	.....	.01	29,500	11,890	Shattered from end to end. Flew into 3 pieces.
466b	.....	.01	23,500	9,480	Crushed at knot at middle. Split along grain.
381a	22	.01	9,600	3,870	Crushed at knot 1" from middle. Opened between rings.
343e	22	Even.	12,950	5,220	Split and crushed at end. Cross-grained.
343	.....	...do..	15,200	6,130	Triple flexure. Deflected diagonally.
1032a	.....	...do..	17,200	6,940	Crushed 3" from end. Cross-grained.
643b	.....	.01	17,100	6,900	Triple flexure. Split at ends.
643	.....	Even.	16,100	6,420	Do.
679a	.....	.02	16,600	6,690	Shattered and crushed at end.
679	.....	Even.	21,050	8,490	Crushed fibers at middle.
683b	.....	.02	15,700	6,330	Crushed near middle at ½" knots.
683	.....	Even.	12,600	5,080	Split obliquely from middle to end, crushing fibers at middle.
353a	.....				
353b	.....	.01	16,380	6,600	Crushed at ⅜" knot at middle.
515e	11	Even.	17,300	6,980	Crushed at ⅜" knot 1" from middle.
262aa	.....	...do..	19,400	7,820	Triple flexure.
262a	.....	...do..	15,280	6,160	Crushed at two ¼" knots at end.
263	.....	...do..	15,100	6,090	Crushed 2" from end at knot.
263a	.....	.01	14,500	5,850	Crushed at ½" knot at middle.
461d	.....	Even.	16,450	6,630	Crushed 1" from middle.
409a	.....	...do..	23,000	9,270	Crushed 1" from middle. Deflecting diagonally.
492b	.....	.01	19,200	7,740	Crushed at knot at middle. Split obliquely.
461e	.....	.01	24,100	9,720	Split along grain at end. Slight crushing.
461f	.....	.02	21,800	8,790	Crushed at end. Oblique split.
488a	.....	.02	26,350	10,625	Triple flexure.
488b	.....	Even.	27,700	11,170	Crushed near middle.
500a	.....	.01	24,850	10,020	Crushed 2½" from end and split along grain.
500b	.....	Even.	24,100	9,720	Crushed 4" from end vicinity of knots.
746a	.....	.02	15,950	6,430	Split obliquely from middle to end.
1063a	.....	.01	15,200	6,130	Deflected at middle. Split at ends.
930	.....	Even.	12,100	4,880	Crushed at end.
930	.....	...do..	11,050	4,460	Crushed 4" from end at ⅞" knot.
333	7	.01	17,250	6,960	Split at end. Season crack at middle. Cross-grained.
1124a	.....	Even.	16,850	6,790	Triple flexure. Knots on concave side.
458b	.....	...do..	19,650	7,920	Split obliquely from end to end. Cross-grained.
458	.....	.02	12,800	5,160	Split along season crack. Cross-grained.
61b	.....	.01	16,500	6,650	Triple flexure. Deflected diagonally.
61c	.....	Even.	17,400	7,020	Do.
1084a	10	.02	18,300	7,380	Deflected 1" from middle.
1084b	.....	.02	17,700	7,140	Do.
1162e	12	Even.	18,550	7,480	Triple flexure. Deflected diagonally, intersecting "Cooper" lines.
1162a	12	...do..	17,420	7,020	Triple flexure.
425a	13	.01	20,050	8,080	Crushed at end.
811a	.....	.02	16,300	6,570	Triple flexure.
811	.....	Even.	17,400	7,020	Triple flexure. Deflected diagonally.
347e	.....	.02	13,550	5,460	Crushed at ¼" knot 3" from end and at ½" knot at end.
738a	10	Even.	14,300	5,770	Failed at ¼" knot 5" from end and split along grain.
738b	11	.01	16,300	6,570	Triple flexure.
660b	.....	Even.	14,200	5,730	Crushed at middle on one face.
660	18	...do..	12,950	5,220	Crushed at middle vicinity of ½" knot.
39e	.....	...do..	16,600	6,690	Triple flexure.
130a	5	...do..	20,300	8,190	Crushed 2½" from end.
130b	5	...do..	19,200	7,740	Crushed 4½" from end.
114b	22	...do..	12,900	5,200	Triple flexure.
114b	24	...do..	12,300	4,960	Triple flexure. Split at ends.
114ac	11	...do..	21,000	8,470	Crushed 1" from middle. Deflected diagonally.
114ad	14	...do..	21,900	8,830	Crushed 1" from end.
114ab	14	.01	12,700	5,120	Crushed 1½" from middle. "Cooper" lines.
144	8	.02	15,700	6,330	Triple flexure. Split at ends.
212e	4	Even.	17,600	7,100	Crushed at middle.
212a	4	...do..	17,100	6,900	Crushed 1½" from middle.
267a	28	...do..	14,200	5,730	Crushed 1½" from middle.
267a	20	...do..	14,350	5,790	Deflected diagonally. Maximum bend 1½" from middle.
227a	12	...do..	16,050	6,470	Deflected diagonally. Crushed 2" from middle.
227ae	24	.02	16,500	6,650	Crushed at ½" knot ½" from middle.
227af	30	Even.	16,200	6,530	Triple flexure.
431a	24	...do..	18,400	7,420	Do.
551e	11	...do..	16,400	6,610	Do.
551	22	...do..	14,850	5,990	Deflected, and fibers crushed 3" from end.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
747*a*	.....	Even.	11,150	4,500	Crushed at ½" knot at middle.
747*b*	.....	...do ..	11,200	4,520	Triple flexure. Split at ends.
1045	8	...do ..	19,600	7,900	Triple flexure. Middle bend ¾" from middle.
1045	8	.01	19,150	7,720	Do.
364	11	.01	20,800	8,390	Triple flexure.
364	11	Even.	17,400	7,020	Crushed at knot 4" from end.
987*a*	.....	...do ..	15,800	6,470	Crushed at end, and 3" from end vicinity of knots.
229*e*	11	...do ..	18,300	7,380	Failed at knot 2½" from end. Cross-grained.
229*a*	16	...do ..	17,780	7,170	Triple flexure.
1059*a*	8	.02	9,950	4,010	Triple flexure. Deflected diagonally.
57*a*	10	Even.	14,300	5,770	Deflected at middle.
308*e*	7	...do ..	16,200	6,530	Crushed at middle on one face.
308*f*	12	...do ..	12,850	5,180	Triple flexure.
957	7	.01	17,400	7,020	Crushed at ¼" knot 2" from end.
957	7	Even.	16,900	6,810	Triple flexure.
948*b*	13	...do ..	21,500	8,670	Triple flexure. Middle bend 1½" eccentric.
948	7	...do ..	17,850	7,200	Deflected diagonally.
438*a*	10	...do ..	19,000	7,660	Crushed 3½" from end splitting between rings.
536*a*	7	.02	8,850	3,570	Crushed 3" from end.
125*a*	28	Even.	13,950	5,625	Triple flexure intersecting "Cooper" lines.
66*a*	9	.02	19,300	7,780	Triple flexure.
66*b*	12	Even.	20,500	8,270	Trifle flexure deflected diagonally.
291*a*	20	...do ..	15,100	6,090	Crushed on one face ¾" from middle.
408*a*	18	...do ..	14,980	6,040	Crushed at one 1" and 5" from end.
518*a*	6	...do ..	18,980	7,650	Crushed at knots 4" from end.
286*1a*	13	...do ..	20,600	8,310	Deflected at middle and at 1/10" knot 3" from end.
286*2a*	7	...do ..	18,580	7,490	Crushed at ½" knot 2" from end, crushed near middle.
964*e*	14	.. do ..	21,500	8,670	Crushed at middle.
964	16	...do ..	17,500	7,060	Crushed 1" from middle on one face.
1001*e*	14	.02	19,400	7,820	Triple flexure. Deflected diagonally.
1001*f*	8	.01	19,980	8,060	Crushed at end.
1024*a*	16	.01	14,200	5,730	Crushed at middle. Side of stick split off.
1024*b*	20	Even.	12,150	4,940	Crushed at middle.
1030*a*	9	...do ..	20,300	8,190	Do.
1030*b*	6	...do ..	21,600	8,710	Crushed 2" and 4½" from end.
122*a*	22	.. do ..	13,750	5,540	Crushed one face 1" from middle.
839	11	...do ..	16,800	6,770	Triple flexure. Middle bend 1" eccentric.
839	11	...do ..	14,200	5,730	Do.
737*e*	.....	...do ..	14,150	5,710	Split along grain from end to end.
283*e*	.....	.02	19,970	8,050	Crushed along one face.
283*f*	.....	.02	19,980	8,060	Crushed 2½" from end at knot.
584	.....	Even.	19,350	7,800	Crushed 3" from end at knot.
584*e*	.....	...do ..	17,900	7,220	Crushed 4" from end.
1137*a*	.....	.01	23,400	7,440	Crushed fibers 1½" from end.
1137*e*	.....	Even.	17,150	6,920	Oblique fracture along grain. Cross-grained.
942	5	...do ..	13,400	5,400	Crushed at one corner near middle.
942*e*	4	.02	13,900	5,600	Triple flexure. Deflected diagonally.
540*e*	3½	Even.	15,050	6,070	Crushed at end.
744*b*	.....	...do ..	12,400	5,000	Crushed 1½" from middle on one face.
744	.....	.01	11,050	4,460	Crushed 1½" from end.
38	7	Even.	14,700	5,930	Crushed ¾" and 4" from end.
38	6	...do ..	14,050	5,670	Triple flexure.
682*a*	.....	...do ..	10,480	4,230	Failed vicinity of ¾" knot.
490*e*	18	.02	24,250	9,780	Crushed near middle.
490	19	Even.	24,400	9,840	Do.
474*e*	.....	.01	11,900	4,800	Split along grain from middle to end.
474*e*	.....	Even.	9,980	4,020	Crushed at knots 4" from end.
473*e*	.....	.03	27,100	10,930	Crushed 1½" from middle and at end.
473*e*	.....	.01	27,300	11,010	Crushed at middle.
453	.....	Even.	9,600	3,870	Split from end to end. Badly cracked in seasoning.
453*e*	.....	...do ..	8,600	3,470	Split obliquely. Badly cracked in seasoning.
585*e*	.....	...do ..	21,050	8,490	Crushed at 1/8" knot near middle.
585*f*	.....	...do ..	19,400	7,820	Crushed at end.
340	3	.02	11,500	4,640	Crushed 2½" from end.
340	.....	.02	14,400	5,810	Do.
71*e*	18	Even.	13,380	5,390	Crushed 2" from middle and at ends.
71	18	...do ..	14,300	5,770	Crushed at ½" knot 1½" from middle.
387*e*	13	...do ..	12,680	5,110	Crushed 2" from end.
387*e*	11	...do ..	13,950	5,625	Crushed at middle and 2½" from end.
1163*e*	12	...do ..	13,980	5,640	Triple flexure intersecting "Cooper" lines.
1163*e*	12	...do ..	13,300	5,360	Triple flexure.
446*a*	15	.01	14,800	5,970	Crushed 3⅛" and 1½" from end.
814*b*	8	Even.	14,680	5,920	Triple flexure. Deflected diagonally.
814	9	...do ..	14,150	5,710	Do.
954*e*	9	...do ..	12,900	5,200	Triple flexure.
954	16	.. do ..	10,050	4,050	Do.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
708*b*	16	.01	19,300	7,780	Crushed 1⅛″ from end.
703*e*	20	.01	20,800	8,390	Crushed 1″ from middle.
468*a*	.....	Even.	22,950	9,250	Crushed in vicinity of small knots.
459*a*	.....	Even.	18,200	7,340	Split suddenly from end to end.
459	.....	...do..	18,500	7,460	Split suddenly. Oblique fracture.
324	.....	...do..	17,300	6,980	Crushed 2″ from end.
324	.....	...do..	18,550	7,480	Crushed vicinity of small knots 4″ from end.
929*a*	.....	...do..	13,120	5,290	Crushed at end. Cross-grained.
929	.....	...do..	14,950	6,030	Triple flexure.
30*a*	5	...do..	17,300	6,980	Deflected and crushed at end and 4″ from end.
30*d*	10	...do..	18,900	7,620	Crushed at middle.
120*i*	16	...do..	21,800	8,790	Crushed 4″ from end.
134*e*	8	.02	18,500	7,460	Crushed near middle vicinity of knot.
134	9	Even.	18,600	7,500	Triple flexure.
19	12	...do..	19,050	7,680	Crushed at middle and end. Deflected.
19	7	...do..	18,900	7,620	Triple flexure.
1036	5	...do..	15,480	6,240	Triple flexure. Deflected diagonally.
1036	6	...do..	12,300	4,960	Do.
1049*a*	8	...do..	19,950	8,040	Triple flexure. Intersecting "Cooper" lines.
281*e*	13	...do..	16,750	6,750	Triple flexure. Middle bend eccentric.
281*e*	15	...do..	15,200	6,130	Crushed at middle. Deflected diagonally.
958	7	...do..	12,900	5,200	Crushed at knot 4″ from end.
958	3	...do..	11,000	4,430	Crushed at ⅜″ knot near middle.
116*a*	30	...do..	25,100	10,120	Triple flexure. Middle deflection 1″ eccentric.
116*a*	30	...do..	17,300	6,980	Crushed fibers 1½″ from end.
116*b*	30	...do..	21,100	8,510	Triple flexure. Middle deflection 1″ eccentric.
116*a*	30	...do..	21,100	8,510	Triple flexure.
314*a*	.....	...do..	22,900	9,230	Crushed 1″ and 4½″ from end.
314*b*	.....	...do..	22,500	9,070	Triple flexure. Deflected diagonally.
428*a*	.....	...do..	16,200	6,530	Crushed at small knot at middle.
133*a*	7	...do..	15,200	6,130	Crushed at ½″ knot at middle.
133*e*	7	...do..	17,300	6,970	Triple flexure. Deflected diagonally.
380*a*	.....	...do..	13,800	5,560	Crushed at ⅜″ knot 2¼″ from end.
533*e*	28	...do..	15,450	6,230	Triple flexure.
533*e*	28	...do..	17,400	7,020	Triple flexure. Deflected diagonally.
758	.....	...do..	14,050	5,660	Triple flexure.
758	7	...do..	13,950	5,625	Triple flexure. Deflected diagonally.
918*a*	.....	...do..	13,700	5,520	Crushed 1½″ and 4″ from end.
	About 30				
75*a*	11	...do..	12,520	5,050	Crushed on one face 1″ from middle.
75*b*	3	...do..	15,200	6,130	Crushed at knot 2″ from end.
306	4	...do..	12,300	4,960	Crushed at middle. Deflected diagonally.
306	9	...do..	13,600	5,480	Triple flexure. Deflected diagonally.
375*e*	9	...do..	15,200	6,130	Triple flexure.
375*e*	12	...do..	15,500	6,250	Triple flexure. Deflected diagonally.
873	9	...do..	12,100	4,880	Triple flexure.
873	8	...do..	16,100	6,490	Triple flexure. Deflected diagonally.
1111*a*	7	...do..	18,250	7,360	Crushed at middle. Deflected.
1111*e*	.....	.02	17,800	7,180	Crushed at ¼″ knot 4″ from end.
652*a*	9	Even.	15,400	6,210	Crushed at ½″ knots at end and 4″ from end.
486*a*	.....	.04	7,050	2,840	Triple flexure.
486	.....	Even.	4,400	1,770	Crushed at middle and 1½″ from end.
508*a*	.....	.02	9,900	3,990	Oblique split. Cross-grained.
132*a*	.....	.02	19,300	7,780	Crushed at middle and 1″ from end.
132*b*	5	Even.	18,700	7,540	Crushed at middle and end. Deflected diagonally.
1244*a*	6	...do..	13,350	5,380	Crushed 1″ from middle at ⅛″ knot.
1245*a*	6	...do..	13,600	5,480	Crushed ½″ from end, vicinity of small knots.
1246*a*	5	...do..	13,200	5,320	Triple flexure.
1255*e*	3½	...do..	12,850	5,180	Triple flexure. Deflected diagonally.
1255*e*	5	...do..	12,480	5,030	Triple flexure.
253*b*	17	...do..	25,950	10,460	Do.
253	9	...do..	31,100	12,540	Crushed at middle.
21	5	...do..	14,900	6,010	Crushed at end and 4″ from end.
21	6	...do..	12,300	4,960	Crushed at end and 5″ from end.
126*e*	12	...do..	18,150	7,320	Crushed 4″ from end.
126*f*	11	...do..	18,200	7,340	Crushed 5″ and 1¼″ from end.
686*e*	3½	...do..	12,980	5,230	Crushed at middle on one face.
686	5	...do..	9,900	3,990	Crushed ¼″ and 3″ from end and split along grain.
648	.....	.02	11,900	4,800	Triple flexure. Deflected diagonally.
648	.....	Even.	11,150	4,500	Triple flexure.
16	.....	...do..	13,600	5,480	Crushed 5″ and 2″ from end.
16	7	.01	14,100	5,680	Crushed 4″ from end.
1057	18	Even.	14,050	5,670	Crushed at middle.
		...do..			

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
	About	*Inch.*			
76*a*	10	Even.	16,900	6,810	Crushed 2″ from end.
76*b*	12	...do ..	16,800	6,770	Crushed 2¼″ from end.
	About				
76*c*	10	...do ..	15,100	6,090	Crushed 1″ from middle.
	About				
123*a*	16	...do ..	13,500	5,440	Crushed ⅜″ from end.
	About				
393*a*	5	...do ..	9,150	3,690	Crushed 4½″ from end and at end.
145*e*	7	...do ..	11,200	4,520	Crushed 2″ and 4″ from end.
112	7	...do ..	19,900	8,020	Crushed at middle.
117*a*	18	...do ..	21,950	8,850	Crushed 4″ from end.
318*a*	8	.. do ..	20,050	8,080	Split obliquely from end to end.
149*a*	11	...do ..	17,200	6,940	Crushed ½″ from middle and 1½″ from end.
325*e*	7	...do ..	18,400	7,420	Crushed ⅜″ from middle.
951	2	...do ..	18,300	7,380	Crushed 2″ from end.
951	2½	...do ..	21,300	8,590	Crushed 1½″ from end.
407*a*	12	...do ..	21,900	8,830	Crushed 1″ from middle.
766*e*	.....	...do ..	22,000	8,870	Crushed at small knot 1½″ from middle.
766*e*	.....	...do ..	21,350	8,590	Crushed at middle.
415*a*	.....	...do ..	14,400	5,810	Split along grain. Oblique direction.
415*b*	.....	Even.	14,400	5,810	Shattered stick at end.
672*b*	7	...do ..	18,200	7,340	Crushed 2″ from end.
672	.....	...do ..	16,000	6,450	Crushed at ½″ knot at middle.
322	.....	...do ..	15,300	6,170	Split at ends.
322*e*	13	...do ..	18,200	7,340	Triple flexure, intersecting "Cooper" lines.
326	12	.. do ..	13,300	5,360	Triple flexure. Heart.
326	9	...do ..	14,500	5,850	Triple flexure. Deflected diagonally. Heart.
3	11	...do ..	20,050	8,080	Triple flexure. Concave on sap side. 60 per cent. sa
3	11	...do ..	18,300	7,380	Split at end. Heart.
1056*e*	11	..do ..	19,900	8,020	Triple flexure. Deflected diagonally. Concave on side. 80 per cent. sap.
1056*e*	12	...do ..	18,980	7,650	Triple flexure. Deflected diagonally. 90 per cent. s
29*a*	11	.. do ..	19,550	7,880	Failed at ⅜″ knot near middle. Sap.
152	12	...do ..	22,400	9,030	Crushed 1½″ from middle.
1097*a*	18	...do ..	22,080	8,900	Triple flexure. Split from end to end. 45 per cent. s
118*za*	22	...do ..	25,200	10,160	Crushed at end.
118*z*	22	...do ..	25,500	10,280	Crushed 4½″ from end.
	About				
249*a*	15	.01	23,100	9,310	Triple flexure.
249*b*	13	Even.	21,900	8,830	Do.
816*e*	20	...do ..	24,700	9,960	Crushed 2″ from end.
	About				
816*e*	20	...do ..	24,300	9,800	Crushed 1″ from middle.
531*e*	28	...do ..	22,800	9,190	Crushed 1½″ from middle. Heart.
531*e*	28	.. do ..	19,600	7,900	Crushed at knots. Cross-grained. Heart.
539	15	...do ..	23,500	9,480	Crushed 1½″ and 2¾″ from end.
539	20	...do ..	23,180	9,350	Crushed near middle. Heart.
383*e*	5	...do ..	17,200	6,940	Triple flexure. 8 per cent. sap on convex side.
383	7	...do ..	18,300	7,380	Triple flexure. Diagonal direction. 60 per cent. sa concave side.
391*a*	22	.01	21,100	8,510	Triple flexure. Diagonal direction. Heart.
391*b*	12	Even.	21,400	8,630	Triple flexure. 30 per cent. sap on concave side.
1082*a*	.....	.03	18,450	7,440	Triple flexure. Concave on sap side. 5 per cent. he
1082*b*	.....	Even.	17,600	7,100	Do.
1164*a*	18	...do ..	23,350	9,420	Crushed 1″ from end.
1165*e*	11	.02	19,500	7,860	Crushed 1″ from end and split along grain.
1166*e*[4]	14	Even.	19,800	7,980	Triple flexure. 95 per cent. sap.
1170*e*	9	...do ..	20,350	8,210	Crushed ½″ from end. Sap.
254*a*	17	...do ..	24,800	10,000	Triple flexure. Middle deflection 1″ eccentric. ½ sa
289*e*	.....	...do ..	20,200	8,140	Crushed at ½″ knot 4″ from end. Heart.
72*e*	14	...do ..	19,100	7,700	Triple flexure. Sap.
72*e*	19	...do ..	19,800	7,980	Do.
348	14	...do ..	20,650	8,330	Triple flexure. Diagonal direction. Sap.
6	22	...do ..	18,000	7,260	Failed at knot at middle. 80 per cent. sap.
6	14	...do ..	20,050	8,080	Crushed 1½″ from end.
1051	18	...do ..	21,000	8,470	Triple flexure. Middle deflection 1″ eccentric. 8 cent. heart.
88*e*	10	.03	24,150	9,740	Triple flexure. Sap.
88*e*	10	Even.	21,800	8,790	Triple flexure. Diagonal direction. Sap.
2[18]*a*	16	.02	19,300	7,780	Triple flexure. Sap.
1168*a*	22	Even.	18,500	7,460	Do
1168*b*	22	.02	18,500	7,460	Do.
1211*a*	16	.01	20,100	8,100	Triple flexure. Middle deflection 1″ eccentric.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
442*a*	17	.01	19,500	7,860	Triple flexure.
538*c*	.....	Even.	22,980	9,270	Do.
153	9	...do ..	18,100	7,300	Triple flexure. Deflected diagonally. Heart.
153	11	...do ..	20,100	8,100	Crushed at ½″ knot 1″ from middle. Heart.
838	16	.02	19,300	7,780	Triple flexure. Heart.
838	11	Even.	17,600	7,100	Do.
237*a*	14	...do ..	24,600	9,920	Crushed 2″ from middle. Cross-grained.
237*b*	14	...do ..	20,400	8,230	Crushed at knots near middle.
129	9	...do ..	18,600	7,500	Triple flexure. Diagonal direction. 80 per cent. sap, convex side.
362	5	...do ..	16,050	6,470	Triple flexure. Deflected diagonally. Middle bend 1″ eccentric.
362	8	.01	16,400	6,610	Triple flexure. Sap.
740	8	Even.	20,300	8,190	Fibers crushed 4″ from end.
740	9	...do ..	17,400	7,020	Fibers crushed at ½″ knots 4″ from end.
917	.....	...do ..	14,350	5,790	Triple flexure. Diagonal direction.
917	.....	...do ..	16,900	6,810	Fibers crushed 2½″ from end.
497*c*	.....	.02	21,000	8,470	Crushed at ⅜″ knot 3″ from end.
586*a*	5	.01	15,700	6,330	Triple flexure.
665*b*	.....	.01	17,600	7,100	Crushed fibers 2″ from middle.
665	22	Even.	19,950	8,040	Crushed fibers at middle.
8	24	...do ..	12,300	4,960	Deflected laterally and split along grain.
8	About 24	...do ..	11,800	4,760	Triple flexure. Split along grain.
32*a*	9	...do ..	20,200	8,140	Triple flexure.
32*a*[1]	10	...do ..	17,800	7,180	Do.
32*a*[2]	20	.01	17,150	6,920	Crushed fibers at end.
49*a*	30	Even.	20,200	8,140	Crushed fibers ¾″ from end.
49*b*	15	...do ..	16,980	6,850	Triple flexure.
49[1]*a*	13	...do ..	18,600	7,500	Triple flexure. Deflected diagonally.
49[2]	24	...do ..	17,250	6,960	Triple flexure.
49*a*[2]	11	...do ..	18,300	7,380	Crushed fibers at end.
113*a*	30	.. do ..	14,950	6,030	Triple flexure.
113*a*[1]	30	...do ..	18,600	7,500	Do.
113*b*	20	.01	16,100	6,490	Triple flexure. Deflected diagonally.
238*a*	9	Even.	22,100	8,910	Triple flexure.
238*b*	10	.02	21,200	8,550	Crushed 3½″ from end.
250*a*	13	Even.	22,500	9,070	Crushed 1½″ from middle.
250	16	...do ..	21,800	8,790	Crushed at middle. Split along grain, perpendicular to rings.
251*e*	18	...do ..	16,700	6,730	Crushed on one face 1″ from middle.
251*e*	18	...do ..	15,300	6,170	Crushed at ⅜″ knot 2″ from end.
250[1]*a*	30	.02	21,450	8,650	Triple flexure, diagonal direction.
250*a*[2]	20	Even.	18,600	7,500	Do.
403	8	...do ..	19,400	7,820	Fibers crushed in oblique lines at middle and ends.
403	8	...do ..	19,950	8,040	Fibers crushed 1½″ from end.
443*a*	.....	...do ..	14,400	5,810	Deflected 4″ from and split at end.
547	8	.01	19,600	7,900	Triple flexure. Middle bend 1″ eccentric.
547	15	.01	21,000	8,470	Do.
748*e*	13	Even.	19,100	7,700	Crushed fibers 1½″ from end.
749	20	...do ..	17,900	7,210	Triple flexure. Deflected diagonally.
749	18	...do ..	17,300	6,980	Triple flexure. Deflected diagonally. Knot at middle.
895*e*	18	...do ..	14,100	5,690	Split from end to end, opening season cracks.
895*f*	22	...do ..	16,800	6,770	Crushed 4″ from end. Split from end to end perpendicular to rings.
1050	17	...do ..	16,500	6,650	Crushed fibers 1½″ from end.
1050	13	...do ..	16,100	6,490	Triple flexure.
1257*e*	17	...do ..	20,900	8,430	Do.
1257*f*	18	...do ..	18,500	7,460	Crushed fibers 1½″ from end.
670*a*	7	...do ..	14,400	5,810	Crushed at end vicinity of knots.
670	6	...do ..	15,550	6,270	Crushed at ½″ knots 2″ from end.
985*a*	12	.03	18,200	7,340	Triple flexure. Middle bend concave on that side of stick taking bearing at end.
985*b*	12	.03	17,400	7,020	Do.
988*e*	16	Even.	17,300	6,980	Triple flexure. Convex on sap side.
988*e*	16	...do ..	16,380	6,600	Triple flexure. Concave on sap side.
1027*a*	17	...do ..	18,700	7,540	Crushed 5″ from end, and split along grain.
1027	8	...do ..	16,450	6,630	Triple flexure.
1029*a*	17	.03	19,300	7,780	Do.
1029*b*	17	Even.	16,600	6,690	Do.
37[1]	6	...do ..	16,450	6,630	Do.
37[2]	12	...do ..	14,420	5,810	Crushed at ½″ knot at middle.
151*a*	15	...do ..	19,400	7,820	Triple flexure.
151*b*	11	...do ..	22,050	8,890	Do.

TABLE 2.—COMPRESSION TESTS—Continued.

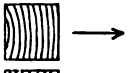
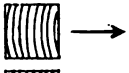
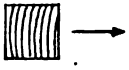
Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
771	30	*Inch.* Even.	19,000	7,660	Crushed at ¼″ knot 4″ from end.
771	About 30	...do ..	17,350	7,000	Triple flexure.
417*b*	17	...do ..	17,550	7,080	Crushed at ½″ knot 1″ from middle.
417*e*	14	...do ..	16,400	6,610	Triple flexure.
525*a*	.....	...do ..	10,100	4,070	Crushed at knots 1½″ from middle. Dry rot.
525*b*	About 40	...do ..	14,750	5,950	Triple flexure. Split along grain.
79*a*	13	...do ..	18,500	7,460	Triple flexure.
79*a*	9	.01	17,900	7,220	Do.
137*e*	11	Even.	19,300	7,780	Do.
143	11	...do ..	15,600	6,290	Do.
310*e*	15	...do ..	18,980	7,650	Triple flexure. Split at end.
310*e*	16	.02	19,200	7,740	Crushed at middle on one face.
857*e*	30	Even.	14,850	5,990	Triple flexure.
857*e*	.....	...do ..	16,400	6,610	Do.
432*a*	12	...do ..	15,950	6,430	Triple flexure. Deflected diagonally.
831*a*	11	...do ..	18,200	7,340	Crushed ¾″ from end.
933	30	...do ..	15,550	6,270	Crushed at end vicinity of ½″ knot.
933	30	...do ..	14,580	5,880	Triple flexure. Deflected diagonally.
1071	7	...do ..	17,600	7,100	Do.
1072	10	...do ..	16,150	6,510	Triple flexure.
1073	9	...do ..	17,500	7,060	Triple flexure. Deflected diagonally.
424	9	...do ..	12,150	4,900	Split obliquely along grain. Cross-grained.
424	7	...do ..	16,100	6,490	Crushed and split at end. Cross-grained.
545*e*	12	...do ..	18,800	7,580	Crushed at middle on one face.
545*f*	18	...do ..	19,300	7,780	Triple flexure. Deflected diagonally.
762	20	...do ..	17,100	6,890	Crushed near middle. Stick worm eaten.
762	20	...do ..	20,600	8,310	Crushed near middle.
12	18	...do ..	16,600	6,690	Triple flexure. Split along grain.
12	16	...do ..	15,900	6,410	Crushed fibers at end.
54*a*	8	...do ..	18,950	7,640	Triple flexure. Split along grain.
54*a*	15	...do ..	17,600	7,100	Triple flexure. Deflected diagonally.
54*a*	16	...do ..	18,600	7,500	Fibers crushed 2⅛″ from end.
54	10	...do ..	18,950	7,640	Triple flexure.
846	7	...do ..	15,480	6,240	Triple flexure. Deflected diagonally.
846	5	...do ..	16,360	6,600	Triple flexure.
755*e*	12	...do ..	18,400	7,420	Triple flexure. Deflected diagonally.
755	8	...do ..	17,500	7,060	Triple flexure. $\frac{3}{16}$″ knot 4″ from end, concave side at end.
524*e*	16	...do ..	17,300	6,980	Triple flexure.
524	13	...do ..	17,600	7,100	Triple flexure. Deflected diagonally.
240	9	...do ..	14,150	5,710	Triple flexure. Split along grain.
240	9	...do ..	17,100	6,890	Do.
31*a*	Variable.	...do ..	19,350	7,800	Crushed fibers at middle.
31*a*	20	...do ..	20,300	8,180	Crushed fibers at end.
35*a*	13	...do ..	23,300	9,400	Crushed fibers 5″ and 1½″ from end.
434*a*	12	...do ..	13,100	5,280	Crushed and split at end.
434	6	...do ..	15,050	6,070	Failed at ½″ knot 4″ from end.
935*a*	18	...do ..	20,500	8,270	Crushed fibers 3″ from end.
925	18	...do ..	17,400	7,020	Split at end. Cross-grained.
34*a*	20	...do ..	17,500	7,060	Triple flexure. Middle bend 1″ eccentric.
84*a*	14	...do ..	24,300	9,800	Crushed at $\frac{3}{16}$″ knot, 3½″ from end.
273*a*	18	...do ..	19,100	7,700	Crushed and split at end.
287*a*	18	...do ..	20,450	8,250	Triple flexure. 
514	18	...do ..	20,100	8,100	Triple flexure. 
514	18	...do ..	20,400	8,230	Triple flexure. 

TABLE 2.—COMPRESSION TESTS—Continued.

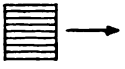
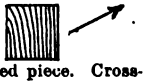
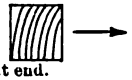
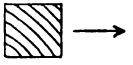
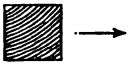
Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength. Total pounds.	Ultimate strength. Pounds per square inch.	Manner of failure.
		Inch.			
822	11	Even.	20,206	8,150	Deflected 3″ from end and split along grain.
688	18	...do..	19,200	7,740	Crushed fibers 2″ from middle.
688	15	Even..	20,100	8,100	Crushed fibers near middle.
655	.....	...do..	13,800	5,560	Stick shattered at season cracks.
655	.....	...do..	16,800	6,770	Stick shattered at knots and season cracks.
698a	.....	...do..	16,900	6,810	Crushed at ".1 knot 1″ from end.
1103a	16	...do..	19,000	7,660	Failed at knots 2″ and 3″ from end.
1103b	16	...do..	17,400	7,020	Crushed at knots 2″ from end.
1103	10	...do..	20,150	8,125	Triple flexure. Split along grain.
404a	.....	106	23,100	9,310	Crushed at middle and split. Cross-grained.
799	.....	.01	21,400	8,630	Crushed fibers 1″ from middle and 1″ from end.
799	.....	Even..	21,900	8,830	Triple flexure, intersecting "Cooper" lines.
919a	4	...do..	18,000	7,260	Crushed fibers at end. Split along grain.
919b	4	...do..	19,700	7,940	Crushed fibers at middle at ¼″ knot.
954	.....	...do..	14,500	5,850	Crushed vicinity of knots 4″ from end.
954	.....	...do..	16,400	6,610	Triple flexure.
649a	12	...do..	19,500	7,860	Crushed fibers 1½″ from middle.
649b	12	...do..	20,900	8,430	Crushed fibers at end.
653	About 20	...do..	20,000	8,060	Crushed at knot 2″ from middle.
653	20	...do..	16,500	6,650	Crushed at knot 2½″ from end.
654a	.....	...do..	14,900	6,010	Crushed at end and split. Cross-grained.
662a	.....	.01	17,300	6,980	Crushed fibers 2½″ from middle.
662b	.....	.02	15,400	6,210	Crushed at 2 ½″ knots ¾″ and 2½″ from end.
685	.....	Even..	17,750	7,160	Crushed and splintered at end.
685	.....	...do..	19,850	8,000	Crushed at end.
7a	8	...do..	21,200	8,550	Crushed 2″ from end. Opened grain.
7c	7	...do..	22,250	8,970	Crushed 1½″ from end.
45½a	18	...do..	15,200	6,130	Triple flexure. 
45½c	16	.01	16,800	6,770	Do.
45½b	18	Even..	14,600	5,890	Crushed 1½″ from end.
89	10	...do..	23,600	9,520	Crushed fibers 4″ from end.
89	9	...do..	23,200	9,350	Crushed fibers ¾″ and 3½″ from end.
92a	7	...do..	15,250	6,150	Triple flexure. Deflected diagonally. 
140a	11	...do..	15,700	6,330	Crushed at end, splitting off wedge-shaped piece. Cross-grained.
141a	12	...do..	15,500	6,250	Crushed at end and 1″ from middle.
146	12	...do..	12,400	5,000	Crushed at ¼″ knot 2″ from end.
215e	9	...do..	19,100	7,700	Triple flexure. 
215e	6	...do..	20,300	8,190	Crushed fibers at end.
217	9	...do..	17,200	6,940	Triple flexure. Deflected diagonally.
217e	6	...do..	19,900	8,020	Triple flexure. 
218e	20	...do..	19,800	7,980	Crushed fibers at end.
920e	18	...do..	14,100	5,690	Crushed fibers 1″ from middle.
920e	18	...do..	12,300	4,960	Crushed fibers 2″ from end.
1043	8	...do..	21,950	8,850	Triple flexure. Middle bend 1″ eccentric. 
1043	7	...do..	19,980	8,060	Crushed at end and 4″ from end.
931a	9	.02	20,500	8,270	Triple flexure. Middle deflection 1″ eccentric.
931b	14	.01	20,550	8,290	Crushed at knots 4½″ from end.
752	2½	Even..	17,800	7,180	Triple flexure; diagonal direction.

TABLE 2.—COMPRESSION TESTS—Continued.

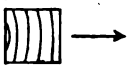
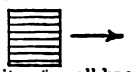
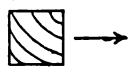
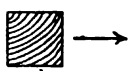
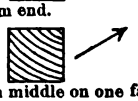
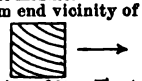
Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
17*e*	7	Even..	19,600	7,900	Crushed at end and 4″ from end.
17*e*	6	...do ..	20,020	8,070	Crushed fibers near middle.
36*a*	Vary from 6 to 30	...do ..	16,600	6,690	Crushed 2″ from end at ½″ knot.
36*x*a	16	...do ..	21,200	8,550	Crushed fibers on one face ½″ from middle.
36*z*a	3	.01	16,150	6,510	Deflected and split along grain from end to middle.
74*a*	6	.02	19,600	7,900	Triple flexure.
86*a*	11	Even..	18,200	7,340	Do. 
244*a*	24	.01	12,200	4,920	Do. Brittle.
244*b*	24	Even..	11,250	4,540	Crushed and split at end. Brittle.
247*b*	11	...do ..	19,100	7,700	Crushed ½″ and 3″ from end.
247*b*	15	...do ..	21,080	8,500	Crushed at end.
437*a*	10	...do ..	16,950	6,830	Crushed ¾″ from end.
628*a*	5	...do ..	18,150	7,320	Crushed 2″ from end.
628*b*	6	...do ..	18,300	7,380	Triple flexure.
963*a*	18	...do ..	14,100	5,690	Crushed and splintered at end.
963	18	...do ..	12,800	5,160	Splintered at end.
268*a*	10	...do ..	17,120	6,900	Triple flexure. 
339	5	...do ..	17,950	7,240	Crushed in vicinity of small knots.
131*a*	3	.01	20,300	8,190	Crushed 2½″ from end.
131*b*	3	.01	20,200	8,150	Crushed 1″ and 4″ from end.
245*e*	10	.01	21,450	8,650	Crushed ¾″ from end.
245*e*	10	Even..	22,250	8,970	Crushed 1″ from end.
265*x*a	10	.01	21,380	8,620	Crushed on one face 1″ from middle and at end.
265*z*a	10	.01	20,020	8,070	Crushed 4″ from end.
548*a*	20	Even..	22,060	8,900	Crushed at end and 4½″ from end.
548	18	...do ..	20,450	8,250	Crushed 3½″ from end.
342	12	...do ..	15,010	6,050	Triple flexure. Deflected diagonally.
342	12	...do ..	17,050	6,875	Triple flexure. Split along grain.
770	8	...do ..	15,900	6,410	Triple flexure. Knot at middle.
770	10	...do ..	16,550	6,670	Crushed at end and at ½″ knot 2″ from end
47*a*	10	...do ..	18,600	7,500	Crushed at end.
47	9	...do ..	17,980	7,250	Do.
282*a*	4	...do ..	17,550	7,080	Triple flexure. 
282*b*	4	...do ..	15,200	6,130	Triple flexure.
349	3	...do ..	19,200	7,740	Triple flexure. 
349	3½	...do ..	19,400	7,820	Crushed 2½″ from end.
264*x*a	15	...do ..	17,580	7,090	Triple flexure. 
264*x*a	20	...do ..	17,200	6,940	Crushed 1″ from middle on one face.
264*z*a	20	.02	16,600	6,690	Do.
511	8	Even..	15,800	6,370	Crushed at knots at middle and 2″ from end.
511	6	...do ..	16,250	6,550	Crushed at ½″ knot 3″ from end.
742*a*	8	...do ..	18,200	7,340	Crushed fibers at middle.
742*a*	11	...do ..	18,950	7,640	Crushed 3½″ from end vicinity of small knots.
756	7	...do ..	18,950	7,640	Triple flexure. 
756	9	...do ..	17,380	7,010	Crushed in vicinity of ½″. Knot 4″ from end.
801	20	...do ..	20,900	8,430	Crushed 1″ from middle.
801	13	.. do ..	17,050	6,875	Crushed 3½″ from end, and at end.
1171*e*	4	...do ..	11,400	4,600	Crushed at 1″ knot 2″ from end.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength. Total pounds.	Ultimate strength. Pounds per square inch.	Manner of failure.
1171e		*Inch.*			
352a	3	Even.	17,700	7,140	Crushed 4″ from end.
674b	12	.03	15,800	6,370	Split at end and splintered 4″ from end. Brittle.
674	.....	.01	4,900	1,980	Oblique split 6″ long. Cross-grained.
40_2	.....	Even.	15,800	6,370	Triple flexure. Deflected diagonally. Split at end.
40_2	6	...do..	17,700	7,140	Crushed at end.
	7	...do..	19,900	8,020	Triple flexure.
60	11	...do..	19,500	7,860	Triple flexure.
125	11	.01	20,850	8,410	Crushed 3″ from end.
512	4	Even.	13,200	5,320	Crushed at $\frac{3}{4}$″ knot at end.
512	4	...do..	14,300	5,770	Triple flexure.
687b	.....	...do..	19,300	7,780	Triple flexure. Middle bend 1″ eccentric.
687	14	...do..	14,250	5,750	Crushed 1$\frac{1}{2}$″ from middle at $\frac{3}{16}$″ knot.
729	16	...do..	12,480	5,030	Crushed at end at $\frac{1}{2}$″ knot.
729	11	...do..	18,200	7,340	Crushed at end.
573a	7	...do..	17,980	7,250	Crushed at 2″ from end.
573b	6	...do..	16,950	6,830	Crushed at $\frac{3}{16}$″ knot 2″ from middle.
18e	13	...do..	11,680	4,710	Crushed 1″ from middle at $\frac{1}{2}$″ knot.
18	13	...do..	9,120	3,680	Triple flexure.
258_1	10	...do..	16,500	6,650	
258_2a	7	...do..	15,950	6,430	Crushed 4″ from end on one face.
516a	11	...do..	14,050	5,670	Crushed 1″ from end.
9e	18	...do..	17,300	6,980	Crushed 1$\frac{3}{4}$″ from end.
9e	18	...do..	15,600	6,290	Crushed 1$\frac{5}{8}$″ from middle and split along grain.
44_2a	16	...do..	16,680	6,730	Crushed 2$\frac{1}{2}$″ from end.
44_2a	16	...do..	17,650	7,120	Crushed 3″ from end.
119a	20	.02	19,450	7,840	Crushed 1″ and 5″ from end.
119b	20	Even.	18,400	7,420	Crushed at end.
765	20	...do..	14,320	5,770	Crushed at middle and end.
765	20	...do..	15,050	6,070	Crushed at middle vicinity of $\frac{1}{2}$″ knot.
853	16	...do..	18,250	7,360	Crushed at end.
853	16	...do..	15,950	6,430	Crushed 1″ from end.
11a	15	...do..	20,700	8,350	Crushed $\frac{3}{4}$″ from end.
11	15	...do..	21,900	8,830	Crushed 2″ from middle.
877	20	...do..	21,400	8,630	Triple flexure. Middle bend 1″ eccentric.
877	20	...do..	14,020	5,650	Triple flexure.
1047e	18	...do..	17,600	7,100	Crushed 3$\frac{1}{2}$″ from end.
1047	18	...do..	19,050	7,680	Triple flexure. Deflected diagonally.
46a	18	...do..	15,350	6,200	Crushed 2″ from end. Opened grain.
73e	20	...do..	20,700	8,350	Deflected at middle and split ends.
73e	20	...do..	18,900	7,620	Triple flexure.
1038a	.....	...do..	15,320	6,180	Triple flexure.
10a	4	...do..	13,500	5,440	Split at knots. Cross-grained.
10b	7	...do..	11,700	4,720	Triple flexure.
848a	7	.05	11,600	4,680	Crushed at $\frac{1}{4}$″ knot 4″ from end.
836	6	Even.	19,600	7,900	Crushed and split at middle. Cross grained.
836	6	-- do..	17,600	7,100	Crushed 1″ from end.
722a	7	...do..	18,400	7,420	Crushed 1$\frac{1}{4}$″ from middle on one face.
722b	7	...do..	14,800	5,970	Crushed 4″ from end.
990	.....	...do..	14,300	5,770	Crushed 1″ from middle. Deflected diagonally.
990	About 14	...do..	14,500	5,850	Crushed at middle at $\frac{1}{2}$″ knot.
1065e	.....	...do..	18,400	7,420	Crushed 3″ from end at $\frac{1}{2}$″ knot.
					Crushed at $\frac{7}{16}$″ knot at middle.

TABLE 2.—COMPRESSION TESTS—Continued.

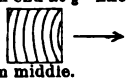
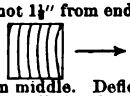
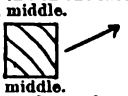
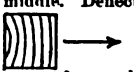
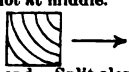
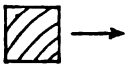
Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
1065*c*	.....	Even.	16,500	6,650	Crushed at ¼″ knot at middle.
1066*c*	8	.02	16,500	6,650	Crushed at 1½″ from end.
1066*f*	8	Even.	16,650	6,710	Crushed at ¼″ knot 1½″ from end.
1067*c*	9	...do..	17,300	6,980	Crushed 3″ from end and at end.
1067	9	...do..	21,300	8,590	Crushed 1½″ from middle.
528*a*	.....	...do..	12,500	5,040	Crushed at middle. Opened grain ¾ length of stick.
629	.....	...do..	15,100	6,090	Crushed at middle. Split along grain.
843*c*	11	...do..	18,250	7,360	Crushed 2″ from end.
843*c*	11	...do..	22,200	8,950	Do.
1068	12	...do..	21,900	8,830	Do.
1068	14	...do..	22,250	8,970	Triple flexure.
1069*c*	24	...do..	23,420	9,440	Crushed 2½″ from end.
1069*c*	24	...do..	23,900	9,640	Do.
1070	20	...do..	20,300	8,190	Crushed at ½″ knot 1″ from middle.
1070	20	...do..	22,500	9,070	Crushed at middle.
136*c*	6	...do..	16,180	6,520	Crushed at middle at $\frac{3}{16}$″ knot.
136*c*	6	...do..	15,700	6,330	Crushed 1½″ from end at ⅜″ knot.
841	8	...do..	15,980	6,440	Triple flexure. 
841	8	...do..	16,900	6,810	Crushed 1¾″ from middle.
842*c*	About 8	...do..	13,380	5,400	Crushed at ¼″ knot 1½″ from end.
842	8	...do..	14,550	5,870	Triple flexure. 
4*c*	8	...do..	20,000	8,060	Crushed 1½″ from middle. Deflected diagonally.
4	8	...do..	19,450	7,840	Triple flexure. Middle bend 1½″ eccentric.
221*c*	12	...do..	24,300	9,800	Crushed 3½″ from end.
221*c*	12	...do..	24,100	9,720	Crushed at middle.
844	About 20	...do..	20,900	8,430	Crushed 4″ from end.
844	About 20	...do..	22,300	8,990	Crushed ¾″ from middle. Deflected.
967*c*	12	...do..	13,300	5,360	Crushed at middle.
967	12	...do..	15,380	6,200	Crushed 1½″ from middle.
991*c*	10	...do..	13,250	5,340	Crushed 3″ from end.
991*c*	8	...do..	15,050	6,070	Triple flexure. Middle bend 2″ eccentric.
1025*a*	8	.02	14,900	6,010	Crushed 1″ from middle.
1025*b*	7	Even.	16,000	6,450	Crushed 4″ from end.
717	14	...do..	11,000	4,440	Crushed 4½″ from end at ½″ knot.
717	11	...do..	10,800	4,350	Crushed 4″ from end on one face.
979*c*	3	.06	11,400	4,600	Crushed 1″ from middle.
979	4	Even.	14,100	5,690	Triple flexure. 
635*a*	9	...do..	15,480	6,240	Crushed 1″ from middle.
694	2	...do..	9,800	3,950	Crushed 3½″ from end at ½″ knot.
694	2	...do..	9,830	3,960	Crushed 4″ from end at ½″ knot.
874	6	...do..	10,160	4,100	Crushed 1″ from middle. Deflected.
232*c*	8	...do..	10,020	4,040	Triple flexure. 
855*a*	6	.02	5,020	2,020	Crushed at $\frac{3}{16}$″ knot, 2″ from end. Cross grained.
908*c*	4	Even.	7,700	3,100	Crushed at ¼″ knot at middle.
908*c*	4	...do..	9,600	3,870	Triple flexure.  Split along grain.
911	5	...do..	11,400	4,600	Crushed 2″ from end. Split along grain between ri
911	5	...do..	8,550	3,450	Crushed at $\frac{3}{16}$″ knot 2″ from middle.
690*a*	2½	...do..	11,050	4,460	Triple flexure.
690	2½	...do..	11,500	4,640	Triple flexure. 

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
840a	7	Inch.			
981b	9	Even.	9,640	3,890	Crushed 2″ from end in vicinity of knots.
981	11	...do ..	13,100	5,280	Crushed ½″ from middle at $\frac{1}{16}$″ knot.
988a	5	...do ..	13,350	5,380	Crushed 2½″ from end and at end.
721a	14	...do ..	10,100	4,070	Crushed ⅜″ from middle at ½″ knot.
721e	14	.01	14,400	5,810	Crushed near middle on one face. Deflected.
972a	11	Even.	14,400	5,810	Crushed at ½″ knot 3″ from end.
972b	14	...do ..	17,800	7,180	Crushed at middle.
908e	11	...do ..	15,200	6,130	Crushed at $\frac{3}{16}$″ knot near middle.
	14	.05	15,500	6,250	Triple flexure. Deflected diagonally closing up .05″ opening at bearing.
860e	15	Even.	14,600	5,890	Triple flexure.
669a	6	.02	13,600	5,480	Crushed near middle on one face.
1177e	2½	Even.	9,800	3,950	Crushed 2″ and 4″ from end.
1177f	2½	.07	9,500	3,830	Crushed at ½″ knot 1½″ from end.
272b	14	Even.	9,300	3,750	Crushed 2″ and 4½″ from end. Split along grain.
272	14	...do ..	10,400	4,190	Triple flexure.
272	12	...do ..	11,700	4,720	Triple flexure. Middle bend 2½″ eccentric.
1035a	7	...do ..	13,800	5,560	Crushed one face 1½″ from middle.
1035b	7	.02	13,100	5,280	Crushed one face 1½″ from middle.
847	7	Even.	12,400	5,000	Crushed 3½″ from end.
847	7	...do ..	12,850	5,180	Triple flexure. Middle bend 1½″ eccentric.
522e	1½	...do ..	9,980	4,020	Crushed at ⅝″ knot 4″ from end.
961a	6	...do ..	10,300	4,150	Crushed at ½″ knot 1″ from end.
961b	6	...do ..	12,300	4,960	Triple flexure. Middle bend 1½″ eccentric.
1054	5	...do ..	9,980	4,020	Crushed 3″ from end.
1054	5	...do ..	9,500	3,830	Triple flexure.
552a	7	...do ..	9,550	3,850	Failed at ½″ knot 1″ from middle.
1012a	16	...do ..	12,900	5,200	Crushed 1½″ from middle.
1012b	16	...do ..	13,700	5,520	Crushed 2″ from end.
1028a	6	...do ..	13,650	5,500	Crushed 1½″ from middle.
1028b	5	...do ..	14,800	5,970	Crushed 1″ from middle.
255a	.....	...do ..	10,500	4,230	Triple flexure.
304a	3	...do ..	9,400	3,790	Crushed at middle, and opened along grain.
304b	3	...do ..	10,010	4,040	Crushed 4″ from end.
309a	3	...do ..	13,800	5,560	Crushed 1½″ from end.
309	About 2	...do ..	13,700	5,520	Crushed at middle.
754c	3	...do ..	13,650	5,500	Crushed at ½″ knot 1½″ from middle.
754e	3	...do ..	16,150	6,510	Crushed 1″ from middle. Deflected.
659e	About 4	...do ..	13,500	5,440	Crushed 1½″ from end.
659	4	...no ..	13,200	5,320	Crushed 1½″ from middle at ½″ knot.
646a	.....	...do ..	12,400	5,000	Crushed 1″ from middle. Deflected.
646b	.....	...do ..	11,500	4,640	Triple flexure. Middle bend ¾″ eccentric.
909a	3	.02	14,900	6,010	Crushed 3½″ from end.
909b	3½	Even.	14,800	5,970	Crushed at $\frac{3}{16}$″ knot 2½″ from end.
912	4	...do ..	12,050	4,860	Crushed 1″ from end, vicinity of $\frac{1}{16}$″ knot.
912	4	...do ..	13,050	5,260	Triple flexure.
634a	20	...do ..	12,380	4,990	Crushed 1″ from middle.
634b	20	...do ..	13,480	5,440	Crushed at end and 4″ from end. Split along grain whole length.
662e	20	...do ..	19,300	7,780	Crushed at middle.
662a	20	...do ..	20,500	8,270	Crushed at end. Opened along grain.
379a	20	...do ..	10,200	4,110	Crushed 1″ from end.
379b	20	...do ..	10,020	4,040	Crushed ½″ and 2½″ from end.
782	24	...do ..	12,200	4,920	Crushed 1″ and 4″ from end.
782	26	...do ..	11,100	4,480	Triple flexure.
783e	26	...do ..	12,300	4,960	Crushed ½″ and 4″ from end.
783e	26	...do ..	11,900	4,800	Triple flexure. Middle bend 1″ eccentric.
790e	24	...do ..	10,550	4,250	Triple flexure. Small knots at middle.
790	20	...do ..	9,600	3,870	Crushed 3½″ from end, and at end.
792e	11	...do ..	6,600	2,660	Crushed 2″ from end.

TABLE 2.—COMPRESSION TESTS—Continued.

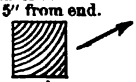
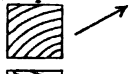
Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
792*c*	11	Even.	7,100	2,880	Crushed 1″ from end.
796	20	...do ..	10,020	4,040	Crushed 1¼ from end.
796	24	...do ..	11,250	4,540	Triple flexure.
874*a*	30	...do ..	13,150	5,300	Crushed 3¼″ from end.
874	30	.. do ..	14,400	5,810	Triple flexure.
1099*a*	22	...do ..	9,750	3,980	Split at knot at middle. Sides swelled.
1099*b*	20	...do ..	12,800	5,160	Crushed 2″ from end. Split along grain.
1017*c*	20	.. do ..	15,200	6,130	Crushed at worm hole, 2″ from end. Split along
1017	20	...do ..	18,300	7,380	Crushed 1½″ from middle. Sudden fracture.
1021*a*	16	...do ..	14,100	5,690	Crushed 3½″ from end.
850*c*	6	...do ..	9,700	3,910	Crushed 1″ from end.
850*c*	5	...do ..	9,050	3,650	Crushed 1″ from end.
850*c*	16	...do ..	8,950	3,610	Crushed 3″ from end at ½″ knot.
850*c*	15	...do ..	8,280	3,340	Crushed at middle, vicinity of ½″ knots.
851*c*	16	...do ..	8,850	3,570	Crushed at end. Opened grain.
851	18	...do ..	10,100	4,070	Crushed at ½″ knot, 2″ from end. Opened betw
852*c*	12	.01	9,200	3,710	Crushed 1½″ from end.
852*c*	13	.01	9,050	3,650	Crushed 1″ and 5″ from end.
969	22	Even.	13,000	5,240	Triple flexure. 
969	30	...do ..	15,550	6,250	Crushed 1½″ from end.
983*a*	30	...do ..	18,100	7,300	Crushed 2¼″ from end. Opposite marks mad bearing transverse test.
983*b*	30	...do ..	17,150	6,920	Triple flexure. Middle bend 1½″ eccentric.
994*c*	30	.02	17,000	6,850	Crushed 1″ from end.
994*c*	30	Even.	16,400	6,610	Crushed at ½″ knot 1½″ from middle.
1000*c*	30	...do ..	15,360	6,190	Crushed 1″ and 4″ from end.
1000	30	...do ..	15,910	6,420	Crushed 2″ from end.
701*a*	8	...do ..	15,950	6,430	Crushed 1″ and 2″ from end. Split along grain.
707*c*	10	.. do ..	16,450	6,630	Crushed at end and 4″ from end.
707*c*	9	...do ..	16,900	6,810	Crushed 2″ from end.
691*a*	12	...do ..	12,550	5,060	Triple flexure.
691	9	.. do ..	16,200	6,530	Triple flexure.
1100*c*	6	...do ..	11,580	4,670	Crushed at middle. End shattered. Split alo Fractured suddenly.
1100	5	...do ..	10,300	4,150	Splitalonggrain. Flew into 4 pieces. Fractured
939	.....	...do ..	19,950	8,040	Shattered stick 5″ from end and at end.
1102*a*	20	...do ..	15,000	6,050	Split obliquely. Cross-grained and knots.
1102	20	...do ..	21,300	8,590	Triple flexure.
327*c*	7	...do ..	15,700	6,330	Crushed 4″ from end and split along grain.
327	.....	...do ..	16,400	6,610	Triple flexure. Middle bend 1½″ eccentric.
734	6	...do ..	17,450	7,040	Crushed 1″ and 5″ from end.
734	6	...do ..	15,980	6,440	Crushed at ½″ knot 1″ from end.
800*c*	.....	.02	12,600	5,080	Opened grain at ½″ knot near middle.
800	.....	Even.	15,500	6,250	Crushed at ⅜″ knot, ½″ from end.
887	20	...do ..	11,300	4,560	Triple flexure. 
887	20	...do ..	10,900	4,400	Triple flexure.
1055	11	...do ..	12,900	5,200	Crushed vicinity of ½″ knot at middle.
1055	.....	...do ..	15,600	6,290	Crushed at middle. Deflected.
1249*a*	.....	...do ..	18,200	7,340	Crushed at knot at middle.
1250*a*	20	...do ..	12,960	5,230	Crushed at knot near end.
1253*a*	About 40	...do ..	14,500	5,850	Triple flexure. Opened grain.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength. Total pounds.	Ultimate strength. Pounds per square inch.	Manner of failure.
		Inch.			
535e	30	Even.	15,500	6,250	Crushed 2″ from end.
535f	30	...do...	17,700	7,140	Crushed 2½″ from end.
542e	20	...do...	14,900	6,010	Crushed 1″ from end.
542	20	...do...	14,900	6,010	Crushed 1½″ from middle.
741e	4	...do...	13,950	5,625	Crushed 2″ from end.
741	6	...do...	12,560	5,060	Crushed at end.
657e	18	...do...	13,980	5,640	Crushed at middle.
657e	18	...do...	13,400	5,400	Do.
673b	18	...do...	15,250	6,150	Crushed 1″ from middle.
673b	18	...do...	16,300	6,570	Crushed at middle.
710	30	...do...	15,700	6,330	Crushed 3″ from end.
711b	16	...do...	14,380	5,800	Crushed at middle. Flew into fragments.
711	16	...do...	17,590	7,090	Crushed 2½″ from end. Two pieces flew off.
712a	6	...do...	11,700	4,720	Crushed 1½″ from middle.
712b	6	...do...	11,600	4,680	Crushed 2″ from end.
713e	24	...do...	15,700	6,330	Crushed 1½″ from middle.
713f	24	...do...	13,100	5,280	Crushed 1″ from middle, vicinity of $\frac{1}{16}$″ knot.
714	20	...do...	16,200	6,530	Crushed at middle and 1½″ from end. Opened grain.
715a	8	...do...	13,900	5,600	Crushed 4″ from end. Split from end to end. Grain curly.
978b	8	...do...	14,700	5,930	Failed at ¾″ knot at middle.
978	11	...do...	19,400	7,820	Crushed near middle at $\frac{1}{16}$″ knot.
62e	.....	...do...	16,000	6,450	Crushed at ½″ knot 2″ from middle. Opened grain.
62e	.....	...do...	16,200	6,530	Crushed ¾″ from end.
277e	15	...do...	17,280	6,970	Triple flexure.
277	14	...do...	15,450	6,230	Triple flexure.
651a	16	...do...	12,300	4,960	Crushed 2½″ from middle at $\frac{3}{16}$″ knot.
651	22	...do...	12,500	5,040	Triple flexure.
1e	.....	.02	11,900	4,800	Crushed 2″ from middle.
1	.....	Even.	11,550	4,660	Crushed 2½″ from end.
222a	8	...do...	13,700	5,520	Crushed 3″ from end.
777e	15	...do...	9,760	3,940	Crushed at ¾″ knot 1½″ from middle.
777	15	...do...	9,300	3,750	Crushed at ¾″ knot 2″ from end.
788	26	...do...	13,600	5,480	Crushed 2″ and 4½″ from end.
788	26	...do...	13,900	5,600	Crushed 4″ from end.
789	16	...do...	12,800	5,160	Crushed ½″ from end.
789	22	...do...	10,350	4,170	Crushed at end.
797	11	...do...	12,880	5,190	Crushed 2½″ from middle.
1044e	8	...do...	12,200	4,920	Crushed 1½″ from middle.
1044e	5	...do...	10,950	4,420	Crushed 3½″ from end.
975	18	...do...	13,500	5,440	Crushed 3″ from end.
987e	16	...do...	10,900	4,400	Crushed ½″ from end.
987	22	...do...	10,980	4,430	Triple flexure.
638a	20	...do...	14,200	5,730	Crushed three places near ends.
668a	10	...do...	11,200	4,520	Crushed 1½″ from end.
730b	13	...do...	10,200	4,110	Triple flexure.
819e	22	...do...	13,500	5,440	Crushed 3″ from end.
819	16	...do...	13,500	5,440	Crushed 1″ from middle.
913a	14	...do...	9,980	4,020	Crushed at ¾″ knot 3″ from end.
992a	16	.02	10,450	4,210	Triple flexure.
992	28	Even.	12,900	5,200	Triple flexure.
661	20	...do...	17,700	7,140	Crushed 1½″ and 3½″ from end. Opened grain.
661	18	...do...	16,800	6,770	Crushed 1½″ from end, split obliquely along grain.
656	16	.10	11,600	4,680	Crushed 2½″ from end at ¾″ knot.
656	22	.02	12,300	4,960	Triple flexure.
397e	24	Even.	12,300	4,960	Crushed at end at $\frac{1}{16}$″ knot.
882a	.....	...do...	8,900	3,590	Split obliquely along grain.
915a	22	...do...	10,450	4,210	Failed at ½″ knots at middle.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
631*a*	22	Even.	10, 500	4, 230	Crushed at ¾″ knot 3″ from end.
631*b*	22	...do ..	13, 300	5, 630	Crushed at three ½″ knots at middle.
821	15	...do ..	12, 100	4, 880	Crushed 1½″ from end. Cross-grained.
821	15	...do ..	11, 300	4, 560	Crushed at end.
914*a*	16	...do ..	11, 050	4, 460	Crushed at middle and at ½″ knot 1″ from middle.
315*a*	15	...do ..	17, 100	6, 900	Crushed 2″ from end.
315*b*	12	...do ..	18, 300	7, 380	Crushed 2½″ from end.
785*a*	22	...do ..	18, 000	7, 260	Crushed at end.
785	22	...do ..	15, 800	6, 370	Crushed at ¾″ knot 1″ from end.
1074	10	...do ..	14, 600	5, 080	Crushed 1″ and 4½″ from end.
1075	10	...do ..	13, 100	5, 280	Crushed 1″ and 3″ from end.
1076*b*	8	...do ..	15, 180	6, 120	Crushed at ½″ knot at middle.
1076	8	...do ..	16, 200	6, 530	Crushed 2″ from end.
996	4	...do ..	9, 700	3, 910	Crushed 1″ and 4″ from end.
996	5	...do ..	10, 750	4, 330	Triple flexure. Middle bend 2″ eccentric.
1154*e*	14	.01	16, 500	6, 650	Crushed 1″ from end.
1154*e*	14	Even.	16, 200	6, 530	Crushed at end.
1155*e*	9	...do ..	11, 750	4, 740	Shattered at end.
1155*e*	9	...do ..	14, 000	5, 650	Crushed 2″ from end.
1156*e*	10	...do ..	11, 200	4, 520	Crushed at 1″ knot at end.
1156*e*	10	...do ..	10, 900	4, 400	Crushed at 1″ knot at end.
619*a*	26	...do ..	17, 450	7, 040	Crushed 2″ from end.
626*a*	22	...do ..	16, 600	6, 690	Crushed 3″ from end.
630*a*	5	.04	8, 000	3, 230	Triple flexure. Contains knots.
630*b*	6	.07	8, 300	3, 350	Triple flexure. Contains knots.
632*a*	30	Even.	18, 200	7, 340	Triple flexure. Free from knots.
636*a*	16	.. do ..	13, 100	5, 280	Crushed 2″ from end, at mark made by end bearing verse test.
689*a*	16	...do ..	17, 100	6, 900	Crushed 2″ from end, at mark made by end bearing verse test.
718*a*	14	...do ..	14, 250	5, 750	Crushed at end.
718*b*	22	...do ..	14, 280	5, 760	Crushed 2″ from end; ½″ knot at end.
731*b*	10	...do ..	16, 200	6, 530	Crushed at middle.
907*a*	14	.05	8, 580	3, 460	Triple flexure. Knots near middle.
910*a*	11	.10	9, 200	3, 710	Triple flexure ¼″ knot at middle bend.
633*a*	20	Even.	14, 500	5, 850	Triple flexure. Middle bend 1¼″ ecc
633*b*	22	...do ..	12, 000	4, 840	Crushed at middle at ¾″ knot.
667*e*	About 30	.. do ..	14, 900	6, 010	Oblique split 7″ long, separating stick.
667	30	...do ..	17, 500	7, 060	Crushed 2″ from end.
664*e*	.....	...do ..	12, 700	5, 120	Shattered end. Crushed 4″ from end.
664	8	...do ..	11, 100	4, 480	Triple flexure.
997	6	...do ..	17, 200	6, 940	Crushed 4″ from end.
997	8	...do ..	21, 900	8, 830	Crushed 2″ from end.
293*e*	8	...do ..	10, 200	4, 110	Crushed 1½″ from end.
293*e*	8	...do ..	8, 900	3, 590	Crushed at ¾″ knot ¾″ from end.
563*a*	18	...do ..	13, 700	5, 520	Crushed at 3½″ from end.
625*a*	20	...do ..	12, 450	5, 020	Crushed at ⅞″ knot 4″ from end.
625*b*	20	.02	13, 480	5, 440	Crushed at ⅞″ knot at middle.
644*b*	8	.05	12, 150	4, 900	Failed at ½″ knot at middle.
644	10	Even.	11, 600	4, 680	Triple flexure. Middle bend 1″ ecc
1157	15	...do ..	10, 600	4, 270	Crushed at ⅝″ knot 1½″ from middle.
1157	15	...do ..	15, 300	6, 170	Crushed 3″ from end.
676*a*	2½	...do ..	15, 050	6, 070	Crushed 1½″ from end at ⅞″ knot.
676	3	...do ..	14, 400	5, 810	Crushed 2″ to 3″ from end.
576*a*	4	...do ..	8, 250	3, 330	Crushed at knots at middle and near end.
576*b*	4	...do ..	10, 300	4, 150	Crushed 4″ from end.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength. Total pounds.	Ultimate strength. Pounds per square inch.	Manner of failure.
		Inch.			
82e	6	Even.	20,180	8,140	Crushed 3″ from end.
82	8	...do ..	20,250	8,170	Crushed 2″ from end.
355	1½	...do ..	9,800	3,950	Triple flexure.
355	5	...do ..	10,750	4,330	Triple flexure.
388e	30	...do ..	18,600	7,500	Crushed 1½″ from end.
388	About 30	...do ..	16,300	6,570	Crushed 3″ from end.
389	3	...do ..	11,900	4,800	Crushed at middle vicinity of $\frac{3}{16}$″ knot.
389	2½	...do ..	12,750	5,140	Crushed at middle vicinity of knot.
13a	9	...do ..	13,500	5,440	Crushed 4″ from end.
13b	8	...do ..	15,600	6,290	Triple flexure.
1046e	8	...do ..	10,600	4,270	Crushed 2½″ from end.
1046e	8	...do ..	10,450	4,210	Triple flexure.
83e	5	.04	17,500	7,060	Triple flexure.
83e	5	.02	18,120	7,310	Triple flexure.
622	12	Even.	14,500	5,850	Crushed vicinity of $\frac{1}{8}$″ knot 2″ from end.
621	10	...do ..	11,200	4,520	Triple flexure. Contains 7 knots $\frac{1}{8}$″ to $\frac{1}{4}$″.
1169e	10	...do ..	12,850	5,180	Crushed at end at $\frac{1}{8}$″ knot.
1169e	9	...do ..	12,100	4,880	Crushed at $\frac{1}{8}$″ knot 3″ from end.
1172e	.....	...do ..	13,300	5,360	Crushed at middle on one face.
1172e	.....	.12	12,300	4,960	Triple flexure.
279a	4½	.02	12,600	5,080	Triple flexure. Knots at middle.
279	About 5	Even.	13,980	5,640	Crushed at knots at middle.
321e	6	...do ..	11,800	4,760	Crushed 3½″ from end. Split at end.
321	6	...do ..	13,200	5,320	Triple flexure.
671b	7	...do ..	19,100	7,700	Crushed 4½″ from end at $\frac{1}{8}$″ knot.
671e	8	...do ..	16,800	6,770	Crushed 4″ from end.
278b	5	...do ..	17,600	7,100	Crushed at $\frac{1}{16}$″ knots, 1″ from middle.
278	4½	.01	10,500	4,230	Crushed 4″ from end.
319	7	Even.	22,350	9,010	Crushed at $\frac{1}{4}$″ knot, 1″ from middle.
142a	4	...do ..	12,050	4,860	Triple flexure.
142b	5	...do ..	11,900	4,800	Crushed 2″ from end.
544	2	...do ..	6,900	2,780	Crushed 3″ from end, at $\frac{3}{8}$″ knot.
544	2	...do ..	6,400	2,580	Triple flexure.
764e	3½	...do ..	11,800	4,760	Triple flexure.
764e	3½	...do ..	11,850	4,780	Crushed 1½″ from middle, vicinity of knot.
394a	14	.. do ..	10,900	4,400	Triple flexure. Opened grain.

TABLE 2.—COMPRESSION TESTS—Continued.

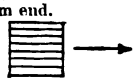
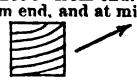
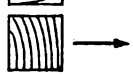
Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
394*b*	14	.02	11,450	4,620	Crushed at end at ¼″ knot.
780*b*	9	Even.	11,200	4,520	Crushed at ¼″ knot, 3″ from end.
780	16	...do..	17,100	6,900	Crushed and opened between rings at end.
879*b*	18	...do..	15,020	6,060	Crushed at ½″, knot at middle.
879	22	...do..	18,050	7,280	Crushed 3½″ from end.
81*b*	22	.02	24,200	9,760	Crushed ½″ to 3″ from end.
81*c*	.....	.02	18,500	7,460	Split obliquely. Stick flew from machine in tw
85*e*	18	Even.	19,000	7,660	Triple flexure.
85*e*	18	...do..	20,550	8,290	Crushed ½″ from end.
243	22	...do..	24,700	9,960	Crushed ¾″ from end.
243	About 30	...do..	22,400	9,030	Crushed at middle.
302	30	.01	17,300	6,980	Crushed near middle.
302	30	Even.	18,000	7,260	Crushed 2″ from end.
357	18	...do..	23,100	9,310	Crushed 1½″ from end. (Photograph.)
357	18	...do..	22,150	8,930	Crushed 1½″ from middle.
358*e*	18	...do..	23,300	9,400	Crushed at end.
358*e*	20	...do..	26,100	10,520	Triple flexure.
359*a*	12	...do..	24,100	9,720	Crushed at middle.
359	15	...do..	26,300	10,600	Crushed and splintered at end.
360*e*	15	...do..	24,400	9,840	Crushed 1½″ from end.
360*e*	15	...do..	24,100	9,720	Crushed 2½″ from middle.
361	22	...do..	23,500	9,480	Crushed 1½″ from end.
361	22	...do..	24,100	9,720	Crushed 3″ from end.
384*e*	28	...do..	21,550	8,690	Crushed and shattered 3″ from end.
384*e*	28	...do..	21,900	8,830	Crushed 2″ from end.
385	4	...do..	19,100	7,700	Crushed 1½″ from end.
385	4	...do..	19,860	4,010	Crushed 3½″ from end.
390*e*	13	...do..	22,500	9,070	Crushed at middle, and 1″ from middle.
390*e*	14	...do..	21,950	8,850	Crushed 2″ from end.
84*e*	24	...do..	19,980	8,060	Crushed 2″ from end, and at end.
84	24	...do..	19,040	7,680	Triple flexure.
356	16	...do..	28,200	11,370	Crushed 2½″ to 4″ from end. (Photograph.)
356	16	...do..	29,950	12,080	Crushed 3″ from end.
493	.....	...do..	18,850	7,600	Split obliquely along grain. Season cracks.
493	.....	...do..	24,550	9,900	Crushed 1″ from middle.
231*e*	22	...do..	18,100	7,300	Crushed at ¼″ knot 3″ from end.
231*e*	22	...do..	14,700	5,930	Crushed at ¼″ knots at middle and end.
373*a*	16	.03	13,760	5,550	Crushed 3½″ from end.
776*b*	16	Even.	13,900	5,600	Crushed at middle at ¼″ knot.
776	13	...do..	13,900	5,600	Crushed at ¼″ knot, 2″ from middle.
794*b*	16	...do..	12,900	5,200	Triple flexure. Middle bend 1″ eccentric.
794	16	...do..	14,050	5,660	Crushed 1″ from end.
880*a*	20	...do..	13,800	5,560	Crushed at middle on one face.
880	20	...do..	14,250	5,750	Crushed ½″ from middle.
513*e*	11	.03	11,280	4,550	Crushed at ¼″ knot at middle. (Photograph.)
513	13	.01	10,300	4,150	Crushed at ⅜″ knot 2″ from end.
620*e*	16	Even.	11,750	4,740	Crushed 2″ from middle.
620*e*	16	...do..	12,000	4,840	Crushed at ⅛″ knot 2″ from end.
773*e*	16	...do..	12,600	5,080	Crushed at ⅛″ knot 1″ from middle.
773*e*	16	...do..	9,960	4,020	Crushed at ⅛″ knot 4″ from end.
784	22	...do..	13,200	5,320	Crushed 1¾″ from middle.
784	22	...do..	13,180	5,310	Crushed 2″ from end.
791	16	...do..	12,500	5,040	Crushed 3″ from end.
791	16	...do..	13,800	5,560	Crushed 2½″ from end.
292*e*	16	...do..	8,900	3,590	Triple flexure. 
292*e*	16	...do..	8,560	3,450	Crushed at ⅜″ knot 3½″ from end.
575*a*	24	...do..	11,600	4,680	Triple flexure.
822*e*	18	...do..	8,600	3,470	Crushed 4″ from end. Cross-grained.
269$_{1}$*a*	8	...do..	8,920	3,600	Crushed 4″ from end at ⅜″ knot.
270$_{1}$*a*	10	...do..	8,360	3,370	Crushed at ⅛″ knot 3″ from end.
270$_{2}$*a*	10	...do..	10,020	4,040	Crushed 1½″ from end, and at middle at ½″ knot
970	10	...do..	14,480	5,840	Triple flexure. 
970	18	.02	13,550	5,460	Triple flexure. 

TABLE 2.—COMPRESSION TESTS—Continued.

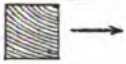
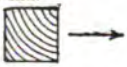
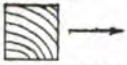
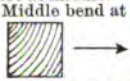
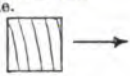
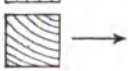
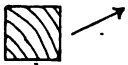
No. of specimen.	Rings per inch.	Condition of bearings.	Ultimate strength. Total pounds.	Ultimate strength. Pounds per square inch.	Manner of failure.
		Inch.			
	8	Even.	12,600	5,080	Crushed 2½″ from end.
	8	...do...	12,300	4,960	Crushed 3″ from end.
	14	...do...	14,300	5,770	Crushed at middle.
	9	...do...	12,400	5,000	Crushed 3″ from end.
	8	...do...	11,500	4,640	Do.
	11	...do...	11,060	4,460	Crushed ½″ and 4″ from end.
	8	...do...	9,980	4,020	Triple flexure. 
5a	20	...do...	13,200	5,320	Triple flexure.
5b	20	...do...	12,580	5,070	Crushed 2″ from end.
219e	26	...do...	16,980	6,850	Triple flexure. 
219e	26	.01	17,400	7,020	Crushed 2″ from middle.
775	6	Even	12,100	4,880	Crushed 1½″ from middle.
775	8	...do...	12,650	5,100	Triple flexure.  Middle bend 2″ eccentric.
778e	12	...do...	11,100	4,480	Crushed and shattered end vicinity of knots.
778	20	.01	11,150	4,500	Crushed at middle at ⅜″ knot.
787e	20	Even	12,900	5,200	Crushed 3″ from end. Opened grain from end to end.
787f	20	...do...	13,890	5,600	Triple flexure.
793	About 50	...do...	16,320	6,580	Crushed at ½″ knot 2½″ from end.
793	50	...do...	18,400	7,420	Crushed ½″ to 1″ from end.
772	12	.02	10,250	4,130	Crushed at ½″ knot at middle.
817e	22	Even	13,940	5,620	Crushed ¾″ from middle.
817e	24	...do...	13,450	5,420	Crushed 1½″ from middle.
040	20	...do...	15,050	6,070	Crushed 3″ from end.
040	20	...do...	12,160	4,900	Triple flexure.
042	6	...do...	11,300	4,560	Crushed 2″ from middle. Oblique grain.
042	7	...do...	14,300	5,770	Crushed 3″ from end.
823a	16	...do...	14,220	5,730	Crushed at ⅞″ knot near middle.
771	28	...do...	20,250	8,170	Crushed 3″ from end.
795	30	...do...	16,800	6,770	Crushed at ½″ knot 1¾″ from end.
795	30	...do...	20,800	8,390	Crushed 2″ from middle.
780	18	...do...	13,980	5,640	Crushed at ½″ knot at middle.
	16	...do...	12,800	5,160	Triple flexure. Middle bend at ½″ knot, 1½″ eccentric.
11a		...do...	14,580	5,880	Triple flexure. 
27a	24	...do...	20,700	8,350	Crushed at end, and 4″ from end.
27b	24	...do...	20,100	8,100	Crushed 2″ from middle.
702a	3	...do...	12,100	4,880	Triple flexure. 
704a	7	...do...	23,300	9,400	Crushed 2″ from end.
705a	8	...do...	19,200	7,740	Triple flexure. 
96a	35	...do...	20,550	8,290	Crushed 3½″ from end.
98a	6	...do...	22,000	8,870	Crushed 1¾″ from end.
98b	6	...do...	24,300	9,800	Crushed 1″ from end at ½″ knot.
90e	20	...do...	16,100	6,490	Crushed 3″ from end.
99e	22	...do...	15,900	6,410	Crushed 3″ from middle.
920a	16	...do...	15,980	6,440	Crushed 2″ from end. Shattered.
920b	20	...do...	19,700	7,940	Triple flexure. Middle bend 1½″ from middle.
932a	13	...do...	17,700	7,140	Crushed ¾″ from end.
932b	13	...do...	17,200	6,940	Crushed at end.
881e		...do...	13,900	5,600	Crushed at ½″ knot at middle.
882	20	...do...	15,200	6,130	Crushed at ½″ knots 1½″ from middle.
973a	8	...do...	17,150	6,920	Crushed 1½″ from end.
973b	6	...do...	15,950	6,430	Crushed at middle.
974a	18	.02	18,960	7,650	Crushed 2″ from end at mark made by transverse test.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
974*b*	18	Even	19,900	9,020	Crushed 2″ from end at mark made by transverse
989	.....	...do	16,950	6,830	Crushed at groups of knots 1″ from middle.
1008*a*	5½	...do	17,100	6,900	Crushed and shattered end.
1008*b*	10	...do	19,800	7,980	Crushed 1½″ from middle.
1016*c*	30	...do	19,800	7,980	Crushed 3½″ from end.
1016*e*	30	...do	21,600	8,710	Crushed 1½″ from middle.
1018	11	...do	22,050	8,890	Crushed 2″ from end.
1018	12	...do	21,300	8,590	Crushed 2½″ from end.
1020*a*	24	...do	17,400	7,020	Crushed 2½″ from end.
1020*b*	24	...do	16,900	6,810	Triple flexure.
1011*a*	10	...do	19,400	7,820	Crushed at ½″ knot at middle.
1011*b*	8	...do	15,000	6,050	Crushed at ½″ knot 3″ from end.
1022*a*	10	...do	18,500	7,460	Crushed 2″ from middle.
1022*b*	11	...do	18,400	7,420	Crushed 2″ from end.
986*a*	20	...do	16,700	6,730	Triple flexure.
642*b*	16	...do	17,500	7,060	Crushed 4″ from end. Opened grain.
642	8	...do	15,150	6,110	Split obliquely. Pieces flew from machine.
528*e*	13	...do	12,950	5,220	Crushed at ½″ knot 2½″ from end.
528*e*	13	...do	11,550	4,660	Crushed at ½″ knot 1″ from middle.
877	19	...do	12,900	5,200	Crushed 1″ from middle.
449$_1$*a*	.....	...do	8,500	3,430	Crushed at ½″ knot at middle. Split along grain.
449$_1$*b*	.....	...do	9,700	3,910	Crushed at ½″, knot 1½″ from middle. Split along
449$_2$*a*	.....	...do	12,480	5,030	Crushed 1½″ from end.
449$_2$*b*	.....	.01	10,700	4,310	Crushed at middle at ½₀″ knot.
820	About 40	Even	11,900	4,800	Crushed at middle.
820	40	...do	10,600	4,270	Crushed and shattered end.
1010*a*	7	...do	13,300	5,360	Crushed 1″ from middle.
1010*b*	5	...do	14,280	5,760	Crushed ¾″ from middle.
529*a*	7	.02	9,500	3,830	Crushed 2″ from end at end bearing transver Split along rings.
529	7	Even	10,950	4,420	Crushed at ½″ knots 1″ from middle.
639*a*	9	...do	12,500	5,040	Triple flexure. Opened grain.
639*b*	9	...do	14,000	5,650	Triple flexure.
733*a*	12	...do	19,000	7,660	Crushed at middle.
733*b*	12	...do	16,550	6,670	Crushed 1½″ from end.
1004*e*	12	...do	15,700	6,330	Crushed at middle.
1004	20	...do	17,280	6,970	Crushed 1″ from middle.
965*a*	8	.01	15,950	6,430	Crushed 2″ from end.
965	8	Even	16,040	6,470	Crushed 1″ from middle.
647*e*	8	...do	16,000	6,450	Crushed 2″ from end.
647	11	...do	14,700	5,930	Triple flexure. Middle bend 1″ eccentric.
226$_1$*e*	20	...do	26,500	10,700	Crushed 1″ from middle.
226$_1$*f*	20	...do	22,900	9,230	Triple flexure. Middle bend 1″ eccentric.
226$_2$	7	...do	15,100	6,090	Crushed at ½″ knot at middle. Split from end to
226$_3$	12	...do	18,000	7,260	Crushed at middle. Split along grain.
774	20	...do	17,400	7,020	Crushed at ½″ knot 2″ from end. Opened betwee
774	20	...do	20,050	8,080	Crushed 2½″ from middle at ½₀ knot.
781	About 24	...do	17,960	7,240	Triple flexure.
781	24	...do	17,950	7,240	Crushed 1″ from middle.
786*e*	24	...do	16,900	6,810	Crushed 2″ from middle.
786	16	...do	20,700	8,350	Crushed 1″ from middle. (Photograph.)
795	15	...do	20,900	8,430	Crushed 2½″ from middle.
795	14	...do	18,600	7,500	Crushed at middle.
840	8	...do	15,360	6,190	Triple flexure. Intersecting "C lines.
840	8	...do	16,600	6,690	Crushed 4″ from end on one face.

TABLE 2.—COMPRESSION TESTS—Continued.

Mark on specimen.	Rings per inch.	Condition of bearings.	Ultimate strength.		Manner of failure.
			Total pounds.	Pounds per square inch.	
		Inch.			
719a	10	Even.	20,650	8,330	Triple flexure. 
719b	11	.02	22,150	8,930	Crushed 2¼″ from end.
984c	20	Even.	27,850	11,230	Crushed at ½″ knot ¾″ from end. Opened between rings.
984	20	...do..	25,680	10,350	Crushed at ½″ knot ⅞″ from end.
1006	18	...do..	25,980	10,480	Crushed 1″ from middle.
1006	16	...do..	23,500	9,480	Crushed 3¾″ from end. Opened grain.
1159	.....	...do..	3,220	1,300	Split obliquely. Fracture 9″ long.
1159	.....	...do..	12,800	5,160	Split obliquely. Fracture 12″ long.

INDENTATION TESTS.

[Description of and details of results in Table 3.]

Dimensions of specimens.

1″.575 by 1″.575 by 6″.30 long, unless the length is otherwise stated in the details of the tests.

The specimens were indented perpendicular to the grain by a cast-iron plunger, which covered the width of the specimen 1″.575 and 1″.575 of the length, the indented section thus being 2.48 square inches.

In the testing-machine the sticks rested against a cast-iron platform, the middle of the opposite face receiving the indenting load.

The loads were gradually applied, and as the plunger indented the wood to different depths, the pressures employed were weighed and recorded.

The depth to which the plunger had reached was indicated by a gauge secured to the plunger rod, and having an arm in contact with the specimen 2″.08 above the center of the indented section, or 1″.30 above the upper edge of the plunger.

Measuring at about this distance from the indented section was found to give reliable indications of the amount of indentation below the general surface of the stick. Close by the indented sections the fibers are drawn inward, while the effect of the load is to warp the stick concave on the indented side, and measurements at the ends would give exaggerated readings.

During the progress of the tests whenever a stick split at the ends the test was discontinued. Sticks shorter than the average length of 6″.30 frequently split at the ends before the indenting plunger had reached the depth of two-tenths of an inch.

Whenever the indented section covered a sound knot, increased resistance was found. Unlike the transverse specimens, the strength of which did not appear to be affected by the direction of loading with reference to the rings of growth, these indented sticks were generally weaker when loaded parallel to the rings. Specimens with the rings quartering showed a disposition to slide the fibers to the side, the stick taking a rhomboidal shape. The fibers usually slid over in the direction in which the rings dip.

TABLE 3.—INDENTATION TESTS.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07..	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*P*
346*c*		4,500	.....	7,100	7,600	7,710	8,090	8,480	
346		3,800	5,260	5,635	5,900	6,185	6,440	6,650	
354		2,540	2,940	3,160	3,410	3,640	3,820	3,980	
354		2,380	2,930	3,160	3,380	3,535	3,675	3,840	
246*b*		2,150	2,960	3,150	3,380	3,500	3,620	3,740	
246*c*		2,240	3,130	3,385	3,640	3,830	3,980	4,165	
261		2,380	2,900	3,130	3,320	3,490	3,660	3,690	
261*c*		2,550	3,040	3,230	3,480	3,670	3,780	3,910	
534*b*		2,240	3,180	3,490	3,660	3,860	4,100	4,210	
534*b*		2,480	3,550	3,900	4,040	4,260	4,450	4,640	
1178*c*		1,950	2,420	2,580	2,730	2,900	2,960	3,100	
1178		2,450	2,920	3,090	3,240	3,390	3,540	3,660	
532*c*		2,920	3,840	4,150	4,420	4,680	4,900	5,110	
532*c*		3,050	3,630	3,890	4,160	4,465	4,580	4,830	
266_1		1,360	2,150	2,420	2,450	2,520	2,680	2,750	
266_2		2,100	2,800	3,060	3,240	3,400	3,570	3,700	
260_1		2,380	3,360	3,670	3,990	4,190	4,400	4,590	
260*c*		2,240	3,560	3,940	4,220	4,480	4,590	4,730	

TABLE 3.—INDENTATION TESTS.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
8,990	9,280	.....	.....	Began to shear fibers.
7,030	7,255	.....	.....	Slight shearing of fibers.
4,190	4,350	.....	.....	Sheared fibers.
3,960	4,130	.....	.....	Slight shearing of fibers.
3,865	3,950	.....	.....	Do.
4,490	4,655	.....	.....	Slight shearing of fibers. Splintered at pith.
2,940	4,040	.....	.....	Fibers compressed without shearing.
4,110	4,190	.....	.....	Sheared fibers.
4,560	4,640	.....	.....	Slight shearing of fibers.
5,080	5,200	.....	.....	Do.
3,360	3,390	.....	.....	Do.
3,836	4,010	.....	.....	Sheared fibers.
5,480	5,810	.....	.....	Do.
5,150	5,300	.....	.....	Do.
2,930	2,960	.....	.....	Indented without shearing fibers.
3,940	4,090	.....	.....	Sheared fibers.
4,995	5,110	.....	.....	Indented without shearing fibers.
4,900	5,060	.....	.....	Slight shearing. Split at ends. Short specimen 4″.70 long.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
395		2,000	2,350	2,480	2,520	2,590	2,650	2,720
1231*b*		2,320	2,840	3,080	3,160	3,380	3,530	3,650
1231*b*		1,890	1,860	2,040	2,160	2,300	2,480	2,540
1232*a*		1,750	2,380	2,540	2,680	2,770	2,870	2,960
1232*a*		1,950	2,230	2,390	2,470	3,620	2,720	2,800
1236*e*		2,020	2,550	2,710	2,850	3,000	3,150	3,260
1236*e*		1,950	2,460	2,570	2,650	2,780	2,880	2,980
818*e*		2,260	2,860	3,060	3,240	3,380	3,540	3,690
818*e*		1,650	2,260	2,580	2,710	2,890	3,020	3,120
211*b*		1,470	1,970	2,110	2,240	2,290	2,370	2,450
211*b*		1,460	2,080	2,320	2,450	2,550	2,640	2,710
479*b*		2,280	3,660	4,150	4,450	4,700	4,910	5,100
479*b*		2,080	3,150	3,550	3,980	4,280	4,560	4,760
1131*a*		7,300	14,700	18,800	20,850	21,500	22,500	23,400
1131*b*		8,100	14,500	16,800	18,400	18,900	19,450	19,700
236*a*		1,400	2,480	2,740	2,960	3,060	3,200	3,390
236*b*		1,180	2,250	2,460	2,670	2,850	2,970	3,160
414*a*		2,400	3,350	3,620	3,850	4,050	4,260	4,420

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
.09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
2, 860	2, 900	.....	.....	Sheared fibers.
3, 850	3, 970	.....	.....	Do.
2, 690	2, 790	.....	.....	Do.
3, 050	3, 180	.....	.....	Do.
2, 980	3, 060	.....	.....	Do.
3, 210	3, 330	.....	.....	Do.
	3, 340	.....	.....	Do.
3, 950	4, 070	.....	.....	Slight shearing of fibers.
3, 360	3, 450	.....	.....	Do.
2, 490	2, 540	.....	.....	Sheared fibers.
2, 840	2, 860	.....	.....	Do.
5, 400	5, 650	.....	.....	Slight shearing of fibers.
5, 060	About 5, 150	.....	.....	Do.
24, 450	24, 750	.....	.....	Sheared fibers and opened grain at middle and end.
20, 600	21, 100	.....	.....	Sheared fibers and opened grain.
3, 620	3, 750	.....	.....	Sheared fibers.
3, 390	3, 520	.....	.....	Do.
4, 730	4, 890	.....	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
414b		2,500	3,380	3,670	3,880	4,070	4,240	4,390
2a		2,060	2,550	2,860	2,940	3,070	3,180	3,300
2a		1,550	1,940	2,040	2,220	2,310	2,450	2,560
1039e		1,350	1,790	1,850	1,970	2,040	2,090	2,180
1039e		1,410	1,810	1,900	1,990	2,080	2,170	2,250
252		1,820	2,060	2,260	2,420	2,510	2,610	2,750
252		1,200	1,750	1,840	1,900	2,010	2,100	2,160
316a		1,460	.....	1,890	1,990	2,090	2,210	2,280
316a		1,350	1,650	1,770	1,890	2,050	2,100	2,200
124e		1,530	1,880	1,970	2,110	2,280	2,300	2,360
124e		1,040	1,530	1,660	1,690	1,750	1,800	1,880
745e		1,350	1,740	1,910	1,960	2,000	2,090	2,160
745e		1,400	1,850	1,960	2,060	2,190	2,300	2,350
285₁		1,060	1,530	1,690	1,800	1,980	1,960	1,980
285₂		1,890	2,180	2,330	2,360	2,480	2,590	2,650
285₃		1,760	1,890	1,980	2,100	2,180	2,280	2,320
320a		1,910	2,410	2,560	2,680	2,780	2,910	3,030
320b		1,650	2,290	2,450	2,560	2,660	2,750	2,860

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".02	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
4, 680	4, 800	.....	.....	Sheared fibers.
3, 480	3, 570	.....	.....	Do.
2, 100	2, 790	.....	.....	Slight shearing of fibers.
2, 520	2, 390	.....	.....	Do.
2, 400	2, 440	.....	.....	Sheared fibers.
2, 950	3, 010	.....	.....	Do.
2, 340	2, 415	.....	.....	Slight shearing of fibers.
2, 440	2, 530	.....	.....	Do.
2, 380	2, 450	.....	.....	Do.
2, 470	2, 475	.....	.....	Sheared fibers.
2, 010	2, 130	.....	.....	Do.
2, 290	2, 370	.....	.....	Do.
2, 570	2, 690	.....	.....	Do.
2, 130	2, 180	.....	.....	Do.
2, 810	2, 890	.....	.....	Do.
2, 510	2, 580	.....	.....	Do.
3, 240	3, 315	.....	.....	Do.
3, 100	3, 170	.....	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	″.0
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pou*
1113*a*		3, 900	6, 450	7, 050	7, 360	7, 660	7, 780	7, 980	8,
1113*a*		3, 550	5, 300	6, 300	6, 950	7, 180	7, 480	7, 750	8,
476		10, 700	19, 100	24, 300	27, 700	29, 900	31, 500	32, 500	32,
1133		3, 900	11, 950	18, 500	23, 400	26; 050	27, 700	29, 200	30,
735*b*		2, 850	4, 400	4, 790	4, 950	4, 980	5, 080	5, 110	5,
735*b*		2, 450	4, 010	4, 480	4, 560	4, 770	4, 900	5, 020	5,
1086*c*		2, 600	4, 150	4, 720	4, 980	5, 160	5, 210	5, 280	5,
1086		4, 500	6, 650	6, 960	7, 290	7, 560	7, 810	8, 040	8,
1140*c*		4, 200	9, 100	11, 650	12, 550	13, 200	14, 100	14, 160	14
1140*c*		5, 900	9, 950	11, 600	12, 500	12, 100	13, 700	14, 150	14
487*c*		1, 900	2, 500	2, 690	2, 890	2, 900	2, 990	3, 180	3
487*c*		1, 910	2, 620	2, 980	3, 060	3, 200	3, 350	3, 480	3
462*a*		1, 240	1, 610	1, 660	1, 770	1, 790	1, 860	1, 900	1
462*b*		1, 070	1, 410	1, 460	1, 480	1, 510	1, 560	1, 570	1,
475*c*		6, 100	12, 900	16, 350	17, 850	19, 180	20, 100	20, 780	21,
475*c*		6, 450	12, 850	15, 800	18, 100	19, 600	20, 300	20, 800	21,
452		4, 600	8, 150	8, 950	9, 550	10, 050	10, 580	10, 800	11,
452		5, 580	9, 500	10, 650	11, 100	11, 780	12, 200	12, 500	12,

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
8,300	About 8,420	.....	.....	Sheared fibers.
8,180	8,280	.....	.....	Do.
33,000	33,300	35,500	35,700	Sheared fibers. Split along grain.
31,300	32,100	34,350	34,700	Sheared fibers. Split along grain. Did not take even bearing.
5,560	5,660	6,350	6,820	Sheared fibers.
5,220	5,290	6,150	6,600	Do.
5,510	5,650	6,650	7,180	Do.
8,500	8,640	10,200	10,550	Do.
15,200	15,400	17,400	17,200	Sheared fibers. Split along grain.
15,000	15,380	17,200	18,000	Sheared fibers.
3,280	3,310	3,850	4,250	Do.
3,560	3,630	4,300	4,580	Do.
1,990	2,060	2,450	2,550	Sheared fibers. Stick worm-eaten.
1,630	1,650	1,880	1,990	Do.
.....	.....	.....	.....	Split along grain at ends.
22,100	23,000	25,200	.....	Sheared fibers. Split at ends.
11,450	11,710	13,350	14,500	Sheared fibers.
13,170	13,470	15,400	16,200	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	P
280		2, 600	3, 950	4, 460	4, 810	5, 210	5, 490	5, 750	
280		3, 420	5, 550	6, 250	6, 780	7, 250	7, 560	7, 940	
484*b*		2, 740	3, 980	4, 200	4, 350	4, 480	4, 680	.....	
484*b*		1, 950	2, 960	3, 200	3, 380	3, 490	3, 720	3, 910	
338*b*		2, 950	4, 380	4, 820	5, 270	5, 680	6, 010	6, 260	
338*b*		2, 650	3, 700	4, 150	4, 440	4, 710	4, 970	5, 180	
454*a*		6, 650	13, 800	17, 400	19, 600	21, 500	23, 200	24, 600	
454*a*		6, 750	14, 100	17, 900	21, 200	23, 600	26, 200	27, 300	
460*b*		7, 600	13, 300	16, 950	19, 850	22, 300	24, 500	25, 600	
460*b*		6, 600	13, 800	17, 850	20, 900	23, 500	26, 000	28, 300	
808*a*		2, 950	4, 050	4, 480	4, 570	4, 840	4, 890	5, 080	
808*a*		2, 750	4, 100	4, 370	4, 570	4, 760	4, 880	5, 020	
998*a*		3, 650	5, 300	6, 080	6, 460	6, 780	7, 060	7, 230	
297*a*		1, 080	1, 760	1, 950	2, 030	2, 140	2, 250	2, 360	
297*a*		2, 150	2, 440	2, 680	2, 750	2, 850	2, 970	3, 080	
684*c*		1, 500	2, 600	3, 200	3, 480	3, 750	3, 820	3, 970	
684*c*		2, 350	3, 160	3, 460	3, 640	3, 840	3, 990	4, 170	
944*c*		2, 340	3, 510	3, 970	4, 180	4, 580	4, 650	4, 840	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds*	*Pounds.*	
6,150	6,570	8,000	8,550	Slight shearing of fibers.
8,620	8,980	10,650	11,400	Sheared fibers.
5,100	5,280	6,050	6,500	Do.
4,070	4,140	4,850	5,400	Do.
6,800	6,980	8,600	9,450	Do.
5,700	5,990	7,040	8,100	Do.
26,700	27,800	.....	.....	Sheared fibers. Split at ends.
30,400	31,900	38,000	.....	Do.
29,200	30,650	38,600	.....	Do.
32,550	34,400	.....	.....	Do.
5,440	5,550	6,350	.....	Do.
5,180	5,260	6,300	6,700	Sheared fibers.
7,390	7,650	8,300	.....	Slight shearing of fibers. Split at ends.
2,550	2,600	3,150	3,400	Slight shearing of fibers.
3,340	3,410	3,920	4,250	Sheared fibers. Split at end.
4,250	4,380	5,140	5,860	Sheared fibers.
4,560	4,690	5,600	6,250	Do.
5,130	5,360	6,050	6,980	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	".0
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pou*
944*s*		2,700	4,700	5,500	5,680	5,950	6,140	6,320	6,
307*s*		3,900	6,950	7,250	7,760	8,250	8,540	8,900	9,
307*s*		4,570	6,840	7,380	7,760	8,160	8,540	8,900	9,
928*s*		4,650	8,140	9,950	10,900	11,700	11,900	12,300	12,
928*s*		4,550	7,420	8,720	9,710	10,250	10,740	11,160	11,
464		6,100	10,900	12,600	13,400	14,150	14,900	15,280	15,
464		3,960	8,600	10,800	12,100	12,950	13,680	14,180	14,
982*a*		3,340	5,100	5,340	5,540	5,740	5,890	6,200	6,
982*a*		4,800	5,770	6,140	6,400	6,640	6,870	7,090	7,
1023		3,600	5,100	5,500	5,650	5,760	5,960	6,100	6,
1023*a*		2,950	3,890	4,400	4,570	4,760	4,920	4,980	5,
1013*a*		3,440	5,680	6,250	6,800	7,170	7,540	7,880	8,
1014*a*		2,700	4,780	6,080	6,700	6,960	7,280	.....	8,
876*s*		4,550	6,960	7,480	7,950	8,270	8,580	8,950	9,
876*s*		4,600	6,450	7,140	7,540	7,940	7,160	8,420	8,
409*a*		3,800	5,100	5,450	5,760	6,160	6,280	6,490	6,
298*s*		5,200	7,400	8,200	8,950	9,450	9,950	10,450	10,
298*s*		6,280	9,600	10,900	11,700	12,300	12,950	13,280	13,

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
6,560	6,780	.....	.....	Sheared fibers. Split at ends.
9,400	9,850	11,600	12,650	Sheared fibers.
9,600	9,960	11,680	13,300	Slight shearing of fibers.
13,400	13,700	15,850	16,650	Do.
11,960	12,270	14,900	16,400	Do.
16,200	16,650	18,100	18,400	Sheared fibers. Split at sides.
15,200	15,800	17,800	19,050	Do.
6,450	6,570	7,250	7,900	Sheared fibers.
7,900	7,700	8,360	9,050	Do.
6,580	6,640	7,560	8,150	Do.
5,380	5,520	6,350	6,900	Do.
8,440	.....	10,700	11,700	Do.
8,200	8,260	9,850	11,100	Slight shearing of fibers.
9,320	9,620	10,800	11,550	Slight shearing.
8,940	9,180	10,600	11,450	Do.
6,850	7,060	8,040	8,600	Sheared fibers.
10,950	.....	.....	.....	Slight shearing of fibers. Split at end.
13,800	13,950	16,600	17,800	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	P
299*a*		6, 300	.....	10, 200	10, 950	11, 600	12, 100	12, 550	
1233*a*		4, 960	7, 280	7, 950	8, 380	8, 780	9, 190	9, 450	
1233*b*		4, 700	6, 100	6, 740	7, 180	7, 400	7, 720	7, 960	
1234*a*		5, 600	9, 100	10, 260	10, 570	10, 890	11, 350	11, 750	
1234*b*		5, 700	7, 900	8, 360	8, 950	9, 360	9, 660	9, 750	
1235*b*		4, 280	5, 960	6, 550	7, 000	7, 450	7, 790	8, 060	
1235		5, 600	8, 050	8, 660	8, 970	9, 260	9, 550	9, 760	
213*c*		3, 400	6, 390	7, 480	7, 890	8, 270	8, 570	8, 880	
213*e*		5, 100	7, 400	8, 260	8, 650	9, 060	9, 550	9, 860	
274*a*		6, 200	9, 300	10, 050	10, 660	11, 200	11, 600	11, 950	
274*a*		4, 100	6, 050	6, 500	6, 980	7, 350	7, 640	7, 970	
1167		6, 670	8, 770	9, 650	10, 140	10, 460	10, 940	11, 200	
1167		4, 800	6, 260	6, 760	7, 340	7, 670	8, 000	8, 270	
757*b*		4, 600	7, 450	7, 960	8, 460	8, 920	9, 200	9, 650	
757*b*		4, 900	7, 150	7, 660	8, 050	8, 360	8, 570	8, 860	
1052*a*		2, 900	4, 960	5, 680	6, 150	6, 390	6, 690	6, 960	
743*c*		2, 600	3, 600	3, 780	4, 060	4, 160	4, 290	4, 470	
743*e*		3, 000	3, 950	4, 100	4, 260	4, 470	4, 720	4, 880	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
13,450	13,950	16,500	17,200	Sheared fibers.
10,100	10,380	12,000	13,200	Do.
8,380	8,750	9,780	10,800	Do.
12,190	12,400	13,800	14,850	Do.
10,100	10,360	12,460	13,600	Do.
8,670	8,900	10,300	11,800	Do.
10,300	10,650	12,300	13,400	Do.
9,560	9,790	11,600	12,600	Do.
10,540	10,780	12,600	13,850	Do.
12,500	12,750	14,100	15,100	Do.
8,580	8,880	10,600	11,480	Do.
11,770	12,020	13,950	14,950	Do.
8,890	9,210	10,650	10,760	Do.
10,190	10,480	11,800	12,900	Do.
9,480	9,580	10,900	11,880	Do.
7,490	7,760	9,300	10,400	Do.
4,720	4,800	5,580	6,000	Do.
5,180	5,290	6,000	6,700	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
530*c*		4, 570	6, 560	7, 160	7, 450	7, 670	7, 950	8, 250	
530*c*		3, 380	4, 180	4, 500	4, 680	4, 980	5, 350	5, 400	
20*c*		4, 300	5, 550	5, 960	6, 260	6, 470	6, 800	7, 170	
20*c*		5, 600	8, 460	9, 540	9, 920	10, 190	10, 480	10, 740	
878*c*		3, 960	5, 840	6, 180	6, 650	6, 880	7, 180	7, 460	
878*c*		3, 240	4, 480	5, 000	5, 350	5, 400	5, 690	5, 960	
1048*c*		3, 980	4, 980	5, 260	5, 530	5, 760	6, 080	6, 160	
1048*c*		3, 000	4, 780	5, 300	5, 650	5, 960	6, 160	6, 300	
311		2, 190	2, 980	3, 260	3, 370	3, 470	3, 660	3, 710	
311		3, 400	4, 960	5, 400	5, 480	5, 490	5, 580	5, 860	
290*a*		1, 900	2, 360	2, 570	2, 900	2, 980	3, 160	3, 270	
290*b*		2, 170	3, 190	3, 550	3, 580	3, 770	3, 910	4, 090	
645*b*		2, 600	3, 260	3, 470	3, 690	3, 710	3, 970	4, 180	
645*b*		2, 650	3, 350	3, 570	3, 690	3, 870	4, 100	4, 300	
736*b*		2, 800	3, 550	3, 700	3, 980	4, 080	4, 340	4, 390	
736*b*		2, 500	3, 080	3, 260	3, 420	3, 610	3, 670	3, 820	
330*c*		2, 450	3, 170	3, 610	3, 890	4, 140	4, 290	4, 540	
330*c*		2, 400	3, 680	4, 250	4, 470	4, 770	4, 780	4, 800	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
8,660	8,870	10,200	10,750	Sheared fibers.
5,920	7,000	.....	.....	Sheared fibers. Split at end.
7,800	7,970	9,400	10,000	Sheared fibers.
11,470	11,680	13,290	14,480	Do.
8,080	8,290	9,550	10,600	Do.
6,270	6,470	7,700	8,250	Slight shearing of fibers.
6,850	7,050	8,050	8,900	Do.
	6,920	8,600	9,550	Do.
6,700				
3,910	4,010	4,550	4,900	Sheared fibers.
6,150	6,160	6,750	7,300	Do.
3,570	3,700	4,350	4,800	Do.
4,200	4,300	4,780	5,090	Do.
4,420	4,590	5,280	.....	Sheared fibers. Split at end.
4,570	4,660	5,400	6,150	Sheared fibers.
4,630	4,740	5,250	.....	Sheared fibers. Split at ends.
3,980	4,090	4,600	4,800	Do.
4,760	4,760	5,350	5,400	Sheared fibers. Split stick.
5,000	4,980	.....	.....	Sheared fibers. Split at ends.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	".08.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
467*a*		3,050	4,250	5,280	6,060	6,460	7,040	7,260	7,570
467*c*		3,600	6,300	7,250	7,780	8,300	8,600	8,950	9,080
405*a*		6,450	8,500	9,580	10,450	11,200	11,800	12,580	13,050
405*c*		5,900	8,550	9,160	9,780	10,500	11,150	11,940	12,280
1247*a*		4,700	7,180	7,970	8,340	8,770	8,970	9,400	9,670
1247*b*		4,200	7,150	8,100	8,550	8,950	9,340	9,650	9,880
1248*a*		5,500	7,780	9,100	9,300	9,550	9,950	10,200	10,650
1248*b*		4,900	7,280	7,950	8,360	8,780	9,170	9,580	9,760
441*a*		5,050	7,370	8,250	8,960	9,470	9,970	10,360	10,680
441*c*		6,490	9,400	10,050	10,600	10,950	11,250	11,700	11,950
815*a*		1,700	4,450	6,000	6,650	6,840	7,070	7,370	7,580
815*c*		4,000	5,160	5,480	5,780	5,960	6,250	6,380	6,670
1031*a*		4,200	7,700	8,550	9,160	9,760	10,170	10,580	11,050
1031*a*		4,500	7,400	8,400	8,900	9,350	9,700	10,050	10,550
650*a*		4,100	8,300	11,900	15,100	17,600	21,000	23,400	25,400
650*c*		9,500	18,200	22,900	26,200	28,600	31,000	32,600	34,100
564*a*		5,700	9,200	10,350	11,300	11,800	12,550	13,050	13,300
564*c*		5,100	8,300	10,200	11,050	11,950	12,570	13,250	13,750

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
7,770	7,870	8,750	9,580	Sheared fibers.
9,470	9,690	10,900	11,800	Sheared fibers. Split at ends.
12,850	14,100	16,500	17,800	Sheared fibers. Split at end.
12,940	13,250	.....	.....	Slight shearing. Split at end.
9,920	10,150	.....	.....	Do.
10,150	10,280	.....	.....	Slight shearing. Split at ends.
10,950	11,120	.....	.....	Sheared fibers. Split at ends.
10,160	10,300	11,700	.....	Sheared fibers. Split at end.
10,980	11,270	13,200	.....	Sheared fibers. Split at ends.
12,200	12,500	.....	.....	Sheared fibers. Split at end.
.....	7,980	8,900	.....	Do.
6,820	7,090	8,300	8,900	Sheared fibers.
11,300	11,680	12,060	13,650	Do.
10,600	10,650	12,350	.....	Sheared fibers. Split at end.
27,500	29,200	.....	.....	Slight shearing. Split at end.
25,400	26,400	29,700	.....	Do.
13,750	14,080	.....	.....	Sheared fibers. Opened season crack.
14,100	14,550	16,600	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
467*c*		3,050	4,250	5,280	6,060	6,460	7,040	7,260
467*c*		3,600	6,300	7,250	7,780	8,300	8,600	8,950
405*c*		6,450	8,500	9,580	10,450	11,300	11,800	12,580
405*c*		5,900	8,550	9,160	9,780	10,500	11,150	11,940
1247*a*		4,700	7,180	7,970	8,340	8,770	8,970	9,400
1247*b*		4,200	7,150	8,100	8,550	8,950	9,340	9,650
1248*a*		5,500	7,780	9,100	9,300	9,550	9,950	10,200
1248*b*		4,900	7,280	7,950	8,360	8,780	9,170	9,580
441*c*		5,050	7,870	8,250	8,960	9,470	9,970	10,360
441*c*		6,490	9,400	10,050	10,600	10,950	11,250	11,700
815*c*		1,700	4,450	6,000	6,650	6,840	7,070	7,370
815*c*		4,000	5,160	5,480	5,780	5,960	6,250	6,380
1031*a*		4,200	7,700	8,550	9,160	9,760	10,170	10,580
1031*a*		4,500	7,400	8,400	8,900	9,350	9,700	10,050
650*c*		4,100	8,300	11,900	15,100	17,600	21,000	23,400
650*c*		9,500	18,200	22,900	26,200	28,600	31,000	32,600
564*c*		5,700	9,200	10,350	11,300	11,800	12,550	13,050
564*c*		5,100	8,800	10,200	11,050	11,950	12,570	13,250

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
7,770	7,870	8,750	9,580	Sheared fibers.
9,470	9,690	10,900	11,800	Sheared fibers. Split at ends.
13,850	14,100	16,500	17,800	Sheared fibers. Split at end.
12,940	13,350	.....	.....	Slight shearing. Split at end.
9,920	10,150	.....	.....	Do.
10,150	10,280	.....	.....	Slight shearing. Split at ends.
10,950	11,130	.....	.....	Sheared fibers. Split at ends.
10,160	10,300	11,700	.....	Sheared fibers. Split at end.
10,980	11,270	13,200	.....	Sheared fibers. Split at ends.
12,200	12,500	.....	.....	Sheared fibers. Split at end.
.....	7,980	8,900	.....	Do.
6,820	7,090	8,300	8,900	Sheared fibers.
11,300	11,680	13,060	13,650	Do.
10,600	10,650	12,350	.....	Sheared fibers. Split at end.
27,500	29,300	.....	.....	Slight shearing. Split at end.
35,400	36,400	39,700	.....	Do.
13,750	14,060	.....	.....	Sheared fibers. Opened season crack.
14,100	14,550	16,600	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	".
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pou*
33_1a		3, 650	4, 580	4, 960	5, 180	5, 380	5, 600	5, 960	6
33_1a		5, 550	6, 260	7, 090	7, 880	7, 570	7, 810	7, 990	8
329a		5, 906	9, 350	10, 600	11, 100	11, 600	11, 990	12, 600	13
932a		4, 500	8, 200	10, 100	11, 160	11, 960	12, 700	12, 950	13
519a		3, 550	6, 450	6, 950	7, 400	7, 780	8, 150	8, 480	8
1241a		3, 650	4, 470	.....	4, 970	5, 120	5, 450	5, 600	5
1242a		3, 150	4, 250	4, 660	4, 920	5, 090	5, 350	5, 560	5
1243a		2, 980	3, 940	4, 250	4, 390	4, 590	4, 780	4, 950	5
53_2b		3, 960	4, 950	5, 100	5, 300	5, 500	5, 850	6, 200	6
53_2a		2, 600	4, 200	4, 780	5, 000	5, 300	5, 500	5, 750	5
444a		4, 500	6, 400	6, 400	6, 770	7, 040	7, 450	7, 850	
760c		4, 700	8, 100	9, 300	9, 550	10, 090	10, 500	11, 100	11
760e		4, 450	7, 600	8, 500	8, 980	9, 400	9, 850	10, 270	10
678a		4, 040	6, 480	7, 200	7, 670	7, 980	8, 160	8, 350	8
678b		3, 200	4, 900	5, 950	6, 500	7, 980	7, 270	7, 680	8
436a		2, 460	3, 900	4, 700	5, 280	5, 870	6, 270	6, 710	7
1089a		3, 900	5, 050	5, 560	5, 960	6, 350	6, 670	7, 020	7
1090a		3, 600	5, 570	6, 160	6, 740	7, 170	7, 390	7, 800	7

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	" 20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
6,280	6,470	7,500	8,280	Sheared fibers.
8,480	8,700	9,980	10,860	Do.
13,390	13,800	15,850	17,100	Do.
14,460	14,670	16,700	17,300	Sheared fibers. Split at end. Compressed area contained ½" knot.
9,050	9,280	10,350	11,380	Sheared fibers. Split at end.
5,900	6,250	7,250	8,050	Sheared fibers.
5,890	6,080	.....	.....	Slight shearing. Split at ends.
5,270	5,410	6,350	.....	Sheared fibers. Split end.
6,780	7,010	8,200	.....	Slight shearing. Split end.
6,120	6,310	7,400	.....	Sheared fibers. Split end.
8,700	8,850	.....	12,150	Sheared fibers.
11,580	11,880	13,080	14,000	Do.
11,080	11,470	13,400	14,000	Do.
8,870	9,000	10,400	11,100	Do.
8,380	8,590	9,980	11,200	Sheared fibers and splintered. ½" knot.
7,400	7,800	9,200	9,980	Slight shearing. Season crack caused uneven loading.
7,470	7,780	9,460	10,360	Sheared fibers.
8,400	8,580	10,000	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	".
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pou*
1091*a*		3, 200	4, 990	5, 900	6, 100	6, 340	6, 770	6, 950	
880*b*		5, 980	9, 300	9, 960	10, 560	10, 870	11, 509	12, 070	12
880*b*		4, 700	8, 570	9, 850	10, 360	11, 000	11, 250	11, 750	11
927*a*		7, 960	12, 950	13, 700	13, 960	14, 400	15, 000	15, 360	15
658*a*		5, 900	9, 050	10, 150	10, 050	11, 550	11, 950	12, 650	12
658*b*		5, 250	8, 650	10, 000	11, 200	11, 670	12, 400	12, 900	13
509*a*		3, 200	4, 100	4, 250	4, 490	4, 760	4, 940	5, 140	
1112*a*		3, 300	5, 160	5, 920	6, 220	6, 540	6, 760	6, 990	
1112*a*		3, 800	5, 850	6, 300	6, 460	6, 850	7, 170	7, 460	
480*a*		3, 800	.....	6, 950	7, 680	7, 800	8, 400	8, 580	
68*a*		4, 100	5, 560	6, 350	6, 950	6, 970	7, 180	7, 370	
68*b*		3, 960	5, 400	5, 960	6, 370	6, 700	7, 100	7, 400	
334*a*		4, 700	7, 050	7, 760	8, 440	8, 850	9, 150	9, 550	
435*a*		2, 500	3, 450	3, 970	4, 370	4, 700	5, 050	5, 260	
233*e*		2, 160	2, 770	2, 970	3, 180	3, 310	3, 390	3, 580	
233*e*		1, 950	3, 270	3, 520	3, 800	3, 980	4, 260	4, 370	
606*a*		5, 950	10, 250	11, 640	12, 900	13, 700	14, 450	14, 900	15
606*a*		5, 160	7, 900	8, 980	9, 980	10, 456	11, 980	11, 650	11

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
7,370	7,550	8,300	9,050	Slight shearing.
12,790	13,290	15,100	16,360	Sheared fibers.
12,170	12,570	14,300	....	Sheared fibers. Split at end.
15,690	15,970	18,100	18,700	Sheared fibers.
13,600	13,700	15,300	16,550	Do.
13,480	13,920	16,200	17,600	Do.
5,390	5,480	6,350	6,90	Do.
7,360	7,580	8,680	9,350	Do.
7,950	8,050	9,250	9,900	Do.
9,350	9,600	11,150	.....	Sheared fibers. Split at ends.
7,890	8,150	9,350	9,860	Sheared fibers.
7,960	8,120	9,300	10,300	Do.
10,280	10,570	12,500	.....	Sheared fibers. Split at end.
5,600	5,750	6,900	7,800	Sheared at corner. ¼" knot.
3,770	3,960	4,580	.....	Sheared fibers. Split at end.
4,660	4,770	5,680	6,400	Sheared fibers.
15,750	16,040	17,700	18,700	Do.
12,200	.....	.....	.....	Slight shearing. Split at ends.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
968*a*		1,350	2,450	2,680	2,760	2,960	3,200	3,270
968*b*		2,150	2,250	2,390	2,560	2,680	2,880	2,970
15*a*		6,960	11,900	13,750	14,650	15,180	15,570	15,920
15*a*		6,850	11,700	12,100	13,050	13,750	14,260	14,650
1053*e*		3,800	5,500	5,960	6,200	6,550	6,820	7,020
1053*e*		5,100	7,800	8,570	9,200	9,770	10,400	10,590
368*a*		3,700	3,660	4,050	4,340	4,580	4,770	4,980
406*a*		2,480	6,060	3,270	3,460	3,560	3,660	3,770
115*a*		4,350	4,940	5,440	5,600	5,950	6,060	6,280
317*a*		4,050	5,250	6,070	.....	6,350	6,350	6,500
317*b*		3,050	3,500	3,650	3,890	4,100	4,280	4,450
127*e*		4,450	5,840	6,350	6,780	7,060	7,350	7,480
127*e*		3,500	4,800	5,160	5,590	5,880	6,110	6,270
763*e*		3,500	4,580	4,980	5,150	5,270	5,540	5,680
763*e*		3,400	4,680	5,180	5,500	5,690	5,980	6,290
418*e*		4,500	5,970	8,250	9,800	9,350	11,020	11,300
418*e*		4,500	7,300	8,240	9,260	9,800	10,360	10,890
637*a*		4,800	7,100	7,850	8,360	8,680	9,010	9,300

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds	Pounds.	Pounds.	Pounds.	
3, 570	3, 720	4, 450	4, 580	Sheared fibers. Split at end.
3, 240	3, 270	3, 780	4. 300	Do.
18, 250	16, 260	18, 000	19, 000	Sheared fibers and splintered.
14, 680		16, 600	18, 100	Sheared fibers.
7, 670		9, 200	10, 100	Sheared fibers. Split at end.
11, 470		13, 180	13, 980	Sheared fibers.
5, 470		6, 480	6, 950	Sheared fibers. Split at end.
4, 080		4, 760	5. 000	Sheared fibers.
6, 820		7, 980	8, 550	Do.
7, 060		8, 100	8, 600	Do.
4, 880		.....	.....	Sheared fibers. Split at end.
8, 350		9, 900	10, 900	Sheared fibers.
6, 980		7, 800	.....	Sheared fibers. Split at end.
6, 070		6, 850	7, 350	Sheared fibers.
6, 720		.....	.....	Sheared fibers. Split at end.
.....		.....	.....	Split at ends.
12, 050	12, 480	14, 860	17, 200	Sheared fibers. Split at end.
9, 870	9, 990	12, 000	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*P*
1032*e*		5,100	8,950	10,360	11,500	12,220	12,770	13,540	
1062*e*		4,900	9,050	10,550	11,700	12,250	12,940	13,460	
1062*e*		4,700	7,950	8,100	8,750	9,240	9,960	10,450	
1158*e*		3,200	5,900	7,050	7,960	8,600	9,100	9,800	
1158*e*		7,100	9,950	11,300	12,400	12,950	13,680	14,290	
883*e*		6,950	11,400	13,920	15,700	16,250	17,400	18,650	
883*e*		6,500	12,200	15,000	16,450	17,600	18,800	.....	
808*e*		3,700	5,300	5,780	6,300	6,680	7,050	7,250	
808*e*		5,280	7,400	.....	.....	.....	9,240	.....	
1087*a*		3,950	6,250	6,990	7,450	7,900	8,120	8,500	
1087*a*		4,200	8,350	9,950	10,650	11,060	11,480	11,760	
1088*a*		5,400	8,050	9,100	9,700	10,080	10,550	10,780	
1088*b*		3,500	5,950	6,980	7,650	8,360	8,940	9,200	
214*e*		2,300	3,380	3,650	3,860	4,120	4,160	4,450	
410*a*		About 1,500	3,100	3,700	3,750	3,780	3,980	4,280	
363_2e		2,110	3,850	4,970	5,480	5,960	6,260	6,650	
607*a*		4,200	5,950	6,680	7,070	7,580	7,880	8,160	
607*b*		2,960	4,370	5,200	5,660	5,980	6,240	6,580	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
14, 480	14, 940	.....	.....	Slight shearing. Split at end. Short specimen 4".72 long.
14, 380	14, 580	17, 400	18, 700	Sheared fibers.
11, 000	11, 360	13, 300	.....	Sheared fibers. Split at end.
10, 800	11, 180	13, 900	.....	Split at end.
15, 480	15, 950	18, 500	21, 900	Slight shearing. ¼" knot.
20, 280	21, 010	27, 000	29, 980	Sheared fibers.
.....	.....	.....	.....	Split at end.
7, 850	8, 100	9, 350	10, 480	Sheared fibers.
10, 000	10, 250	11, 980	13, 200	Do.
9, 200	9, 340	11, 000	.....	Slight shearing. Split at end.
12, 480	12, 610	14, 100	15, 600	Sheared fibers. ¼" knot at corner.
11, 680	11, 740	13, 600	14, 400	Slight shearing.
9, 880	10, 060	11, 200	12, 550	Sheared fibers.
4, 900	5, 000	5, 900	6, 200	Sheared fibers. Split at ends.
4, 480	4, 880	5, 750	6, 480	Sheared fibers.
7, 160	7, 580	9, 150	10, 500	Do.
8, 870	9, 220	10, 980	11, 900	Do.
7, 360	7, 510	9, 100	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
328*e*		3, 900	5, 100	5, 500	5, 900	6, 180	6, 570	6, 800
328*f*		2, 900	4, 750	5, 490	5, 980	6, 180	6, 560	6, 770
1093*a*		3, 750	5, 900	6, 800	7, 450	7, 960	8, 440	8, 800
1093*b*		4, 500	6, 950	8, 060	8, 680	9, 380	9, 880	10, 350
949*a*		2, 900	5, 500	6, 900	7, 680	8, 350	8, 780	9, 300
949*a*		4, 370	6, 580	7, 650	8, 300	8, 950	9, 380	9, 700
1081*b*		5, 400	8, 100	9, 080	9, 800	10, 200	10, 850	11, 050
426*b*		2, 850	5, 200	6, 500	6, 900	7, 450	8, 020	8, 250
426*b*		3, 940	7, 180	8, 300	8, 940	9, 500	9, 880	10, 270
926*a*		2, 900	5, 770	6, 760	7, 340	7, 680	8, 100	8, 620
239*a*		3, 160	5, 950	6, 900	7, 500	7, 900	8, 250	8, 500
767*a*		4, 200	8, 200	9, 800	10, 650	11, 250	11, 900	12, 400
241*a*		4, 500	7, 100	8, 100	8, 800	9, 750	9, 780	10, 750
849*e*		4, 100	7, 100	8, 350	9, 060	9, 900	10, 380	10, 850
849*e*		5, 400	7, 750	8, 700	9, 460	10, 000	10, 720	11, 240
546*f*		3, 140	4, 220	4, 450	4, 630	4, 960	5, 250	5, 460
546*f*		3, 500	4, 040	4, 570	4, 900	5, 100	5, 280	5, 550
1095*e*		2, 940	4, 400	4, 830	4, 960	5, 020	5, 240	5, 320

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
7,290	7,490	8,780	9,470	Sheared fibers.
7,450	7,680	8,960	10,500	Do.
9,400	9,680	11,800	13,300	Do.
11,100	11,400	.....	.....	Slight shearing. Split at end.
10,100	10,480	12,800	14,000	Sheared fibers.
10,450	10,700	12,500	13,500	Do.
11,990	12,200	14,900	15,900	Sheared fibers. Split at end.
9,080	9,450	11,100	12,400	Sheared fibers.
10,900	11,100	12,900	14,300	Do.
9,180	9,450	11,600	12,700	Do.
9,040	9,400	11,000	12,300	Sheared fibers. Split at end.
13,350	13,800	16,300	17,600	Sheared fibers. Indented on knot ¼".
11,450	11,760	14,000	.....	Sheared fibers. Split at end.
11,720	12,100	14,650	16,200	Sheared fibers.
12,090	12,530	14,950	.....	Sheared fibers. Split at end.
5,830	5,990	6,960	7,340	Sheared fibers.
5,960	6,170	7,250	7,980	Do.
5,570	5,600	6,450	6,880	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1095*e*		1,700	2,900	3,250	3,400	3,470	3,690	3,790
1178*e*		4,580	6,270	6,670	6,970	7,280	7,580	7,850
1178*e*		2,640	4,000	4,400	4,620	4,820	5,200	5,450
1181*e*		2,400	3,320	3,500	3,600	3,780	3,880	4,250
1181*e*		2,100	3,200	3,470	3,680	3,880	4,080	4,180
1182		3,050	3,950	4,410	.....	4,910	5,070	5,180
1182		2,300	3,350	3,650	4,000	4,220	4,450	4,610
1183*e*		2,000	3,200	3,600	4,240	4,500	4,610	4,780
1183*f*		2,550	3,280	3,700	4,050	4,180	4,280	4,570
485*a*		4,910	10,500	13,200	14,800	15,900	16,950	17,750
485*b*		2,890	9,200	12,800	15,300	16,700	17,650	18,600
489*b*		5,300	9,200	10,700	11,900	12,680	13,400	14,100
489*b*		6,400	9,900	11,500	12,700	13,450	14,180	14,900
507*a*		1,800	3,340	3,960	4,520	4,700	5,200	5,370
507*a*		2,800	4,350	4,960	5,450	5,820	5,970	6,270
1118*a*		5,150	8,300	10,500	11,900	12,900	13,600	14,580
1118*a*		9,900	12,700	13,100	14,050	15,100	15,600	16,100
1135*e*		5,700	9,980	12,450	13,300	14,400	14,980	16,000

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
4,100	4,260	.....	.....	Sheared fibers. Split at end.
8,380	8,470	9,800	10,760	Sheared fibers.
5,900	5,970	7,250	.....	Sheared fibers. Split at end.
4,350	4,440	5,100	5,380	Sheared fibers.
4,470	4,520	5,300	5,580	Do.
5,700	5,840	6,780	7,280	Do.
5,050	5,170	5,970	6,390	Sheared fibers. Split at end.
5,250	5,390	6,000	6,450	Sheared fibers.
4,900	5,010	.....	.....	Sheared fibers. Split at end.
19,100	19,650	23,450	.....	Do.
20,150	20,840	.....	.....	Slight shearing. Split at end.
15,200	15,620	.....	.....	Sheared fibers. Split at end.
16,150	16,600	19,400	.....	Do.
5,790	6,150	.....	.....	Do.
6,080	6,270	8,100	8,600	Sheared fibers.
16,080	16,700	.....	.....	Opened season cracks.
17,200	17,700	21,000	21,500	Sheared fibers. Split at end
17,150	17,600	19,900	21,500	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*P*
1135*e*		5, 900	9, 900	11, 650	.....	13, 000	14, 000	14, 600	
1127		7, 800	11, 200	12, 700	14, 180	15, 350	16, 400	17, 180	
1127		5, 100	10, 300	13, 100	14, 700	15, 950	16, 950	17, 900	
67*a*		4, 100	8, 200	9, 950	10, 920	11, 420	12, 090	12, 700	
67*b*		6, 500	11, 100	12, 600	13, 550	14, 080	14, 890	15, 600	
1077*a*		1, 900	5, 050	7, 950	9, 740	10, 900	11, 740	12, 600	
1077*b*		4, 300	8, 500	9, 900	10, 900	11, 560	12, 240	12, 590	
1092*a*		4, 900	8, 450	9, 940	10, 900	11, 370	11, 900	12, 360	
761*a*		5, 250	6, 970	7, 700	8, 300	8, 900	9, 350	9, 740	
812*a*		4, 500	6, 900	7, 700	8, 290	8, 780	9, 140	9, 600	
812*a*		4, 300	6, 900	7, 950	8, 580	8, 970	9, 370	9, 700	
960*a*		4, 560	6, 600	7, 370	7, 970	8, 420	8, 850	9, 110	
960*b*		4, 000	7, 050	7, 840	8, 250	8, 700	9, 180	9, 450	
605*a*		3, 100	4, 800	5, 260	6, 560	5, 980	6, 300	6, 550	
605*b*		3, 200	4, 000	.....	4, 740	4, 970	.....	.....	
813*e*		4, 300	6, 060	6, 440	6, 780	7, 150	7, 440	7, 580	
813*e*		2, 600	3, 980	4, 450	4, 980	5, 150	5, 300	5, 500	
750*e*		3, 950	6, 100	6, 900	.....	7, 800	8, 280	8, 580	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
15,750	16,180	.....	.....	Sheared fibers. Split at end.
18,750	19,370	23,400	.....	Do.
19,210	19,820	23,900	26,300	Do.
13,650	14,100	17,200	19,200	Do.
16,500	17,040	19,600	21,600	Sheared fibers. ¼″ knot in compressed surface.
13,550	14,150	16,750	19,100	Sheared fibers.
13,480	14,050	16,300	.....	Sheared fibers. Split at end.
13,070	13,500	15,900	17,500	Sheared fibers.
10,290	10,680	12,400	13,600	Sheared fibers. Split at end.
10,310	10,650	12,700	13,950	Sheared fibers.
10,400	10,800	13,200	14,100	Do.
9,780	10,150	12,100	12,850	Do.
10,080	10,380	12,300	13,600	Do.
6,930	7,250	8,550	.....	Sheared fibers. Split at end.
5,750	5,780	6,700	6,950	Sheared fibers.
7,910	8,060	9,250	9,680	Do.
5,660	5,770	6,700	7,380	Do.
9,300	9,700	11,700	12,900	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
750*e*		5,050	6,900	7,340	7,950	8,360	8,800	9,350	
833*f*		3,600	5,900	6,500	6,750	7,150	7,900	8,150	
833*f*		3,800	5,500	6,050	6,550	6,940	7,290	7,600	
834*e*		3,770	5,580	5,980	6,390	6,680	6,990	7,300	
834*e*		3,050	4,950	5,540	6,280	6,440	6,850	7,050	
835*e*		4,190	5,950	6,900	7,400	7,750	8,150	8,500	
835*e*		4,050	6,040	6,900	7,300	7,780	8,060	8,470	
517*a*		2,950	3,960	4,280	4,550	4,740	4,950	5,140	
128*e*		5,700	5,780	6,340	6,620	6,940	7,340	7,660	
128*e*		5,100	6,500	6,900	7,070	7,380	7,580	7,920	
550*e*		2,800	3,370	3,500	3,700	3,890	4,100	4,320	
550*e*		2,960	4,200	4,500	4,780	4,970	5,250	5,450	
604		3,300	5,100	5,850	6,180	6,640	6,920	7,080	
604		2,650	3,550	3,930	3,980	4,240	4,400	4,670	
681*a*		3,200	4,250	4,560	4,740	4,890	5,050	5,200	
110*aa*		4,400	8,450	10,250	10,970	11,580	12,120	12,600	
110*aa*		4,150	8,800	10,700	11,480	12,150	12,620	13,150	
739*a*		5,440	7,580	8,390	8,890	9,400	9,840	10,240	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
10,000	10,420	12,900	14,000	Sheared fibers.
8,940	9,120	11,300	12,960	Sheared fibers. One edge.
8,120	8,400	10,100	11,400	Do.
7,720	7,970	9,740	11,050	Slight shearing.
7,680	7,890	9,250	10,100	Do.
9,050	9,350	11,100	12,900	Do.
8,960	9,400	11,500	12,380	Do.
5,510	5,780	6,650	.....	Sheared fibers. Split at ends.
8,190	8,440	9,900	10,900	Sheared fibers.
8,470	8,700	10,020	10,900	Do.
4,540	4,700	5,370	5,880	Do
5,850	5,970	6,800	7,350	Do.
7,550	7,700	9,300	9,900	Sheared fibers. Split at end.
4,920	5,090	5,950	6,700	Sheared fibers.
5,480	5,590	.....	.....	Sheared fibers. Split at end.
13,300	13,850	.....	.....	Sheared fibers. Split at ends.
14,200	14,540	.....	.....	Slight shearing. Split at ends.
11,100	11,380	13,900	.....	Sheared fibers one edge. Split at ends.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
466*c*		6,500	12,800	15,300	16,400	17,500	17,950	18,650	
466*e*		7,600	12,700	14,700	15,580	16,480	17,100	17,450	
381*a*		1,300	2,250	3,100	3,470	3,700	3,950	4,080	
343*c*		4,280	7,500	8,450	9,180	9,770	.....	10,800	
343		4,200	7,150	8,250	9,350	9,970	10,470	11,000	
1083*a*		3,950	5,950	7,040	7,500	7,980	8,450	8,870	
643*a*		2,900	5,300	5,940	6,540	6,720	7,200	7,480	
643*b*		4,600	5,920	6,570	7,150	7,590	7,980	8,440	
679*a*		4,280	6,300	7,150	7,750	8,200	8,490	8,810	
679*b*		3,000	5,100	5,820	6 400	6,780	7,150	7,480	
683*a*		3,350	5,700	6,560	7,100	7,520	8,000	8,380	
683*b*		5,200	7,900	8,780	9 370	9,880	10,280	10,700	
353*a*		4,300	6,750	7,670	8 270	8,700	9,340	9,730	
353*b*		2,670	4,900	5,900	6 550	6,950	7,240	7,670	
515*c*		3,300	4,880	5,570	5,940	6,280	6,660	7,040	
515*e*		3,440	4,970	5,700	6,100	6,440	6,620	6,960	
262*a*		5,000	7,250	8,100	8,750	9,050	9,340	9,590	
262*a*		4,900	7,600	8,580	9,200	9,450	9,770	10,100	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
19,800	19,900	21,800	23,600	Sheared fibers. Radial split.
18,000	18,300	.....	.....	Do.
4,260	4,370	4,880	5,340	Sheared fibers ¼" knot in indented a
11,900	12,150	13,900	15,250	Sheared fibers.
11,820	12,100	14,500	15,600	Slight shearing. ¼" knot at edge.
9,480	9,900	11,500	12,600	Sheared fibers.
8,220	8,480	9,850	11,100	Do.
9,080	9,410	11,000	12,600	Do.
9,500	9,740	11,300	12,300	Do.
8,140	8,400	9,900	.....	Sheared fibers. Split at ends.
9,050	9,300	10,850	11,950	Sheared fibers.
11,270	11,480	13,500	14,600	Do.
10,350	10,650	12,500	14,000	Do.
8,290	8,500	9,900	11,150	Do.
7,700	7,960	9,450	10,200	Do.
7,480	7,580	8,700	.....	Sheared fibers. Split at end.
10,100	10,340	12,200	.....	Do.
10,600	10,780	12,400	13,400	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
263*a*		4,500	6,100	6,570	6,850	7,170	7,390	7,570
263₁*a*		4,300	5,440	5,970	6,240	6,350	6,600	6,800
492*a*		4,100	8,300	10,200	11,300	11,950	12,650	13,250
492*b*		9,300	12,300	13,300	14,250	14,970	15,750	16,380
461*e*		5,100	10,000	11,400	12,350	12,950	13,670	14,070
461*f*		6,100	9,550	10,800	11,700	12,100	12,700	13,200
488*a*		4,800	7,700	8,780	9,540	10,160	10,680	11,250
488*b*		4,600	7,540	9,000	9,780	10,400	11,100	11,980
500*b*		2,150	5,480	7,550	8,400	9,070	9,620	10,150
500*b*		2,000	5,000	7,140	8,450	8,980	9,700	9,980
746*a*		3,250	4,750	5,360	5,980	6,380	6,870	7,260
1083*a*		3,900	6,250	6,940	7,550	8,010	8,470	8,870
930		3,050	4,240	4,530	4,780	4,980	5,250	5,450
930		2,150	3,300	3,540	3,730	3,970	4,180	4,360
333*a*		1,940	5,560	6,570	7,250	7,780	8,270	8,740
1124*a*		1,450	5,100	8,200	9,440	10,100	10,580	10,900
458*a*		5,900	9,600	11,700	13,280	14,400	15,200	15,950
458*b*		5,200	8,150	9,900	11,150	12,060	12,900	13,570

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
7,980	8,100	9,400	9,900	Sheared fibers.
7,170	7,280	8,400	9,150	Sheared fibers. Split at end.
14,400	14,850	17,900	19,990	Do.
17,580	18,120	21,500	.....	Do.
15,300	15,690	.....	.....	Slight shearing. Split at end.
13,880	14,250	15,980	17,800	Sheared fibers. Split at end. Short specimen 4¾" long.
12,080	12,450	14,200	.....	Sheared fibers one edge. Split at end.
.....	.....	.....	.....	Split at end.
.....	11,250	.....	.....	Sheared fibers. Split at ends.
11,050	11,480	13,500	.....	Sheared fibers. Split at end.
8,180	8,560	10,700	12,350	Sheared fibers.
9,590	9,960	11,900	12,800	Sheared fibers. Split at corner.
5,810	5,960	6,880	7,580	Sheared fibers.
4,800	5,000	5,960	6,800	Do.
9,620	10,000	.....	.....	Split at ends.
12,080	12,490	14,500	16,450	Sheared fibers.
17,220	17,700	19,700	20,200	Do.
14,800	15,300	18,250	19,900	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
61*a*		4, 200	6, 900	8, 100	8, 820	9, 290	9, 550	9, 980
61*c*		4, 500	7, 500	8, 950	9. 780	10, 350	10, 960	11, 170
1084*a*		3, 850	7, 500	9, 400	10, 360	11, 100	11, 700	11, 950
1084*b*		5, 900	9, 020	10, 550	11, 450	12, 090	12, 600	12, 970
1162*c*		5, 600	9, 910	12, 250	13, 370	13, 940	14, 480	14, 850
1162*e*		2, 850	6, 700	8, 950	10, 350	11, 200	11, 950	12, 360
425*a*		4, 340	7, 940	9, 830	10, 820	11, 660	12, 260	12, 940
811*a*		6, 100	10, 000	11, 800	12, 650	13, 240	13, 800	14, 300
811*a*		4, 200	7, 200	8, 600	9, 570	10, 150	10, 700	11, 200
347*c*		4, 050	5, 750	6, 050	6, 330	6, 540	6, 620	6, 700
347*c*		2, 580	3, 960	4, 340	4, 550	4, 690	4, 880	5, 060
738*b*		3, 080	5, 150	6, 070	6, 610	6, 950	7, 420	7, 710
660*a*		4, 170	4, 910	5, 560	6, 100	6, 500	6, 790	7, 080
660*b*		4, 700	6, 700	7, 550	7, 780	8, 350	8, 600	9, 150
39*e*		2, 940	4, 580	5, 070	5, 370	5, 570	6, 050	6, 460
130*a*		.....	4, 650	5, 280	5, 780	5, 990	6, 480	6, 780
130*b*		2, 370	5, 850	6, 560	6, 940	7, 240	7, 570	7, 780
114*a*		2, 500	2, 950	3, 280	3, 520	3, 550	3, 740	3, 790

TABLE 3.—INDENTATION TESTS—Continued.

Loads for indentations of—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
10,550	10,780	12,400	13,550	Sheared fibers.
11,520	12,200	14,300	15,600	Do.
12,810	13,150	15,500	17,000	Do.
13,640	13,930	16,000	17,100	Do.
15,540	15,920	18,010	19,100	Do.
13,880	13,770	16,350	18,300	Slight shearing of fibers.
13,910	14,280	16,900	18,500	Sheared fibers.
15,540	15,950	18,200	19,400	Do.
11,980	12,360	14,700	16,600	Do.
6,800	6,970	8,200	8,500	Do.
5,390	5,520	6,400	7,140	Do.
8,400	8,640	9,900	11,400	Do.
7,850	8,100	9,600	10,500	Do.
9,940	10,150	12,000	13,400	Sheared fibers along one edge.
6,900	7,070	.....	.....	Split at ends. Short specimen 4".70 long
7,350	7,690	9,300	.....	Slight shearing. Split at end.
8,510	8,680	9,900	11,000	Sheared fibers
3,990	4,150	4,750	5,320	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
114*a*		1,650	2,870	2,940	3,460	3,570	3,570	3,800	
114*ac*		4,400	6,500	6,880	7,270	7,690	8,010	8,450	
114*aa*		3,400	4,150	4,370	4,560	4,860	5,080	5,220	
114*aa*		2,900	4,060	4,500	4,770	5,020	5,350	5,510	
144		3,450	4,920	5,700	6,290	6,680	7,060	7,400	
212*c*		3,500	3,900	4,380	5,010	5,070	5,490	5,710	
212*c*		3,500	3,840	4,460	4,820	5,150	5,520	5,880	
267$_1$		4,100	5,470	6,050	6,370	6,840	7,160	7,470	
267$_2$		5,400	6,500	7,100	7,450	7,880	.....	8,470	
227$_1$*a*		3,500	4,350	4,890	5,020	5,380	5,580	5,800	
227$_2$*c*		3,440	5,570	5,970	6,400	6,590	6,970	7,290	
227$_2$*c*		4,150	6,580	7,470	7,960	8,250	8,740	8,910	
431*a*		3,420	4,760	4,960	5,430	5,670	5,970	6,320	
551*c*		2,600	3,630	3,970	4,260	4,470	4,700	4,840	
551*c*		2,960	3,480	3,850	4,160	4,390	4,680	4,890	
747*a*		3,890	5,680	6,560	6,960	7,130	7,350	7,550	...
747*b*		3,160	3,970	4,370	4,440	4,880	5,100	5,140	
1045		4,460	5,780	6,360	7,050	7,650	8,270	.....	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
4,040	4,060	4,860	5,450	Sheared fibers.
8,890	9,100	10,900	12,300	Split at corner. Fibers not sheared.
5,550	5,680	6,700	6,900	Do.
5,670	5,930	6,900	7,400	Split at corner. Slight shearing.
7,880	8,050	9,900	10,450	Split at end. Fibers not sheared.
6,280	6,580	8,250	9,900	Split at end. Sheared fibers.
6,380	6,740	8,400	9,470	Sheared fibers.
7,900	8,170	9,500	.....	Split at end.
9,020	9,110	10,800	12,000	Slight shearing of fibers.
6,390	6,810	8,560	9,660	Sheared fibers.
7,810	8,700	.....	.....	Sheared fibers. Split at end.
9,370	9,610	11,400	11,650	Sheared fibers.
6,910	7,100	8,650	9,480	Slight shearing of fibers.
5,070	5,160	6,450	6,900	Slight shearing of fibers. Split at end.
5,370	5,560	6,750	7,560	Slight shearing of fibers.
7,780	7,890	8,600	8,600	Sheared fibers.
5,470	5,580	6,560	6,790	Slight shearing of fibers.
10,050	10,150	12,100	13,250	Do

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1045		4, 500	7, 400	8, 550	9, 060	9, 170	9, 490	9, 800
364*c*		2, 920	4, 400	5, 050	5, 750	5, 920	6, 320	6, 870
364*e*		4, 050	6, 490	7, 460	7, 970	8, 390	8, 890	9, 450
937*a*		4, 200	5, 440	5, 940	6, 500	6, 950	7, 350	7, 980
229*xc*		3, 380	5, 550	6, 170	6, 660	6, 970	7, 370	7, 680
229*xe*		3, 050	5, 350	6, 070	6, 500	7, 100	7, 300	7, 550
1059*a*		4, 100	6, 320	6, 940	7, 350	7, 570	7, 980	8, 320
57*a*		3, 480	6, 100	7, 150	7, 400	4, 920	8, 180	8, 550
308*e*		3, 500	4, 950	5, 310	5, 480	5, 660	5, 900	6, 060
308*f*		3, 600	4, 100	4, 300	4, 650	4, 900	4, 750	5, 550
957*b*		4, 650	6, 670	7, 200	7, 650	8, 200	8, 500	8, 790
957*b*		4, 800	7, 060	7, 960	8, 470	8, 860	9, 180	9, 500
948*b*		4, 500	7, 050	8, 020	8, 750	9, 260	9, 880	10, 300
948*b*		4, 100	7, 500	8, 800	9, 440	9, 820	10, 400	10, 600
438*a*		4, 500	5, 970	6, 380	7, 000	7, 450	8, 040	8, 440
536*a*		2, 600	3, 880	4, 260	4, 620	4, 870	5, 100	5, 340
125*b*		3, 200	3, 600	3, 650	3, 760	3, 800	4, 060	4, 180
125*b*		2, 600	3, 320	3, 470	3, 570	3, 690	3, 920	4, 130

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
9,250	9,480	11,980	12,900	Indented without shearing.
7,540	7,780	10,050	11,800	Do.
9,860	9,900	10,500	.....	Slight shearing. Split stick.
8,600	8,790	11,000	12,100	Slight shearing.
8,110	8,270	9,650	10,350	Sheared fibers.
7,780	8,100	9,250	9,750	Do.
8,780	8,980	10,200	11,100	Indented without shearing.
8,900	8,400	10,400	11,100	Do.
6,370	6,470	7,360	7,640	Sheared fibers.
5,980	6,350	7,900	8,800	Slight shearing of fibers.
9,250	9,550	11,100	11,600	Sheared fibers.
10,080	10,300	11,950	13,200	Do.
11,290	11,750	13,750	15,300	Slight shearing of fibers.
11,480	11,660	13,400	14,540	Fibers did not shear.
8,940	9,270	11,100	12,400	Slight shearing of fibers.
5,560	5,690	6,420	6,960	Sheared fibers.
4,470	4,640	5,350	5,700	Do.
4,370	4,490	5,250	5,660	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark or specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	″.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pou*
66*a*		6,350	8,600	9,400	9,740	10,120	10,410	10,690	1
66*b*		5,200	7,980	9,240	9,950	10,770	11,420	12,100	1
291*a*		4,350	6,040	6,880	6,480	6,770	7,060	7,400	
408*a*		2,700	2,960	3,170	3,320	3,400	3,590	3,760	
518*a*		3,650	6,990	8,420	9,180	9,650	9,980	10,460	1
286$_1$*a*		3,400	.....	8,160	8,760	9,150	9,550	.....	.....
286$_2$*a*		2,700	5,980	7,350	8,200	8,560	9,000	9,200	
964*c*		3,200	4,850	5,520	5,920	6,280	6,550	6,790	
964*e*		3,680	5,200	5,680	5,960	6,250	6,470	6,810	
1001*e*		3,600	5,370	5,720	5,790	6,180	6,570	6,660	
1001*f*		4,000	4,900	5,100	5,380	5,780	6,060	6,380	
1024*a*		3,300	4,060	4,320	4,670	4,880	5,100	5,360	
1024*a*		2,900	.....	4,550	4,620	4,720	4,950	5,170	
1030*a*		3,480	4,900	5,450	5,920	6,350	6,820	7,250	
1030*b*		3,020	5,020	5,260	5,850	6,350	6,650	7,080	
122*a*		2,620	3,690	3 850	4,010	4,060	4,160	4,270	
839*e*		5,010	7,380	8,380	8,780	9,080	9,400	9,560	
839*e*		4,700	5,950	6,280	6,800	7,400	7,900	8,420	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
11,370	11,720	14,050	15,500	Slight shearing of fibers.
13,150	13,510	16,500	17,700	Do.
7,670	7,970	9,100	9,800	Slight shearing of fibers, Indented section covers unsound knot ⅜" diameter.
4,060	4,190	5,200	.....	Sheared fibers. Split at end following rings.
11,250	11,500	13,500	15,100	Slight shearing of fibers.
10,800	10,950	13,100	14,350	Do.
9,760	10,020	11,350	.....	Sheared fibers. Split at end.
7,160	7,450	8,550	.....	Slight shearing of fibers. Split at end.
7,200	7,400	8,550	.....	Do.
7,100	7,270	8,000	.....	Do.
6,900	7,150	8,500	9,100	Do.
5,780	5,850	6,940	7,650	Sheared fibers.
5,480	5,590	6,400	6,850	Do.
7,690	7,770	9,100	9,600	Sheared fibers. Split at end.
7,580	7,850	9,150	10,380	Sheared fibers.
4,420	4,590	5,060	5,350	Sheared fibers. Split at end.
10,170	10,390	11,850	12,100	Slight shearing of fibers
9 160	9,520	11,650	12,400	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	".
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pou*
737*e*		1, 920	4, 050	4, 860	5, 140	5, 220	5, 470	5, 680	5
737*e*		3, 080	5, 250	6, 060	6, 460	6, 760	7, 020	7, 150	7
283*e*		6, 050	9, 600	11, 000	11, 900	12, 450	13, 050	13, 500	14
283*f*		5, 400	5, 820	6, 400	7, 080	7, 640	8, 250	8, 650	9
584*e*		4, 900	6, 320	6, 660	7, 350	7, 730	8, 060	8, 350	8
584*e*		4, 500	5, 480	5, 960	6, 750	7, 080	7, 550	7, 870	8
1137*e*		4, 600	8, 280	9, 880	10, 750	10, 950	11, 500	11, 840	12
1137*e*		4, 700	7, 350	8, 460	9, 140	9, 780	10, 320	10, 740	11
942*e*		3, 550	6, 150	7, 360	7, 960	8, 550	8, 900	9, 160	9
942*e*		3, 400	5, 750	6, 760	7, 260	7, 600	8, 050	8, 320	8
540*e*		2, 050	2, 680	2, 940	3, 150	3, 280	3, 360	3, 480	3
744*b*		1, 620	1, 870	1, 920	2, 040	2, 080	2, 160	2, 260	2
744*b*		1, 580	2, 340	2, 540	2, 660	2, 770	2, 870	2, 970	3
38*b*		2, 200	2, 720	2, 980	3, 150	3, 280	3, 420	3, 570	3
38*b*		1, 550	2, 420	2, 580	2, 710	2, 790	2, 910	2, 990	3
682*a*		2, 800	4, 080	4, 640	4, 860	5, 080	5, 440	5, 640	5
490*e*		5, 900	8, 050	8, 800	9, 400	9, 900	10, 370	10, 790	11
490*e*		6, 500	9, 350	10, 600	11, 360	11, 820	12, 260	12, 460	13

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
5,900	6,070	7,420	7,900	Sheared fibers.
7,570	7,680	8,990	9,450	Do.
14,870	14,680	17,100	18,800	Do.
9,450	9,770	12,100	.....	Sheared fibers. Split at end. Short specimen 5" long.
9,060	9,360	11,150	12,400	Sheared fibers.
8,470	8,750	10,500	11,600	Do.
12,390	12,570	14,500	15,600	Do.
11,400	11,780	13,750	14,800	Do.
9,870	10,080	11,550	12,900	Do.
8,900	9,150	10,860	12,000	Do.
3,620	3,810	4,470	.....	Sheared fibers. Split at end. Short specimen 4".7 long.
2,380	2,400	2,870	3,160	Sheared fibers.
3,090	3,170	3,750	4,140	Do.
3,690	3,790	4,320	.....	Sheared fibers. Split at end.
3,180	3,280	3,800	4,280	Sheared fibers.
6,020	6,180	7,440	7,920	Do.
11,380	11,500	.....	.....	Slight shearing of fibers. Split at end.
.....	.....	.....	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
474*e*		1,650	2,870	3,340	3,680	3,850	3,920	3,940
474*e*		1,940	2,920	3,380	3,680	3,810	3,890	4,080
473*e*		9,100	11,900	13,800	15,500	16,100	16,500	16,800
473*e*		5,300	8,400	9,920	10,980	11,720	12,400	12,920
585*e*		4,450	6,700	7,120	7,360	7,560	7,640	7,790
585*f*		3,950	5,750	6,090	6,180	6,450	6,600	6,780
340*a*		4,300	6,350	6,960	7,360	7,750	----------	----------
340*a*		3,420	5,060	5,470	5,640	5,800	5,990	6,160
71*e*		2,990	3,980	4,450	4,490	4,690	4,750	4,780
71*e*		2,450	3,950	4,440	4,560	4,670	4,770	4,880
387*b*		2,450	3,280	3,560	3,670	3,770	3,880	4,070
387*b*		2,360	3,180	3,500	3,620	3,680	3,770	3,890
1163*e*		2,810	4,040	4,560	4,770	4,980	5,320	5,440
1163*e*		3,670	4,960	5,220	5,380	5,490	5,580	5,680
446*a*		3,200	4,170	4,220	4,360	4,530	4,630	4,750
814*e*		3,400	3,920	4,370	4,770	4,960	5,240	5,580
814*e*		2,450	4,150	4,650	4,840	4,970	5,180	5,320
854*e*		2,800	4,560	5,250	5 440	5,560	5,640	5,780

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
3,960	3,980	4,360	4,550	Sheared fibers. Split at end.
4,250	4,420	4,800	.....	Do.
18,500	19,100	22,300	23,800	Sheared fibers.
14,400	14,900	.....	.....	Slight shearing. Split at end. Short specimen 4".7 long.
8,210	8,350	9,500	9,970	Sheared fibers.
7,080	7,170	8,500	9,250	Do.
8,680	8,790	9,900	10,700	Do.
6,570	6,760	7,800	8,550	Do.
5,100	5,110	5,940	6,250	Do.
5,250	5,290	6,100	6,180	Do.
4,270	4,370	4,960	5,380	Do.
3,970	4,160	4,750	.....	Sheared fibers. Split at end.
5,720	5,810	7,050	7,800	Slight shearing of fibers.
5,880	5,930	6,410	6,670	Sheared fibers.
4,980	5,080	5,750	6,080	Do.
6,120	6,310	7,850	8,700	Do.
5,490	5,540	6,360	6,880	Do.
5,950	6,050	6,920	7,350	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01."	".02."	".03."	".04."	".05."	".06."	".07."
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
854*e*		3, 920	4, 320	4, 440	4, 580	4, 700	4, 800	4, 960
708*e*		4, 450	5, 950	6, 550	6, 760	7, 040	7, 340	.....
708*e*		4, 360	6, 050	6, 450	6, 740	7, 050	7, 350	7, 400
468*a*		4, 800	8, 500	10, 700	12, 050	12, 780	13, 430	14, 050
459*a*		8, 050	12, 500	13, 950	14, 920	15, 750	16, 400	17, 100
459*b*		6, 900	9, 940	11, 460	12, 380	12, 950	13, 470	14, 100
824*e*		2, 900	4, 140	4, 980	5, 460	5, 820	6, 180	6, 680
824*e*		5, 900	7, 480	7, 980	8, 460	8, 920	9, 340	9, 610
929*a*		5, 900	8, 500	9, 470	10, 220	10, 780	10, 360	11, 900
929*b*		4, 650	8, 300	9, 250	9, 880	10, 460	10, 920	11, 360
30*a*		3, 700	4, 000	4, 210	4, 480	4, 900	5, 120	5, 350
30*a*		2, 410	3, 260	3, 570	3, 890	4, 090	4, 340	4, 550
120*e*)		3, 450	4, 260	4, 900	5, 380	5, 680	5, 880	6, 080
134*e*		3, 040	5, 020	5, 260	5, 570	5, 920	6, 170	6, 560
134*e*		3, 420	4, 570	5, 070	5, 470	5, 880	6, 520	.....
19*e*		3, 510	5, 180	5, 950	6, 340	6, 550	6, 880	7, 080
19*e*		2, 950	4, 200	4, 780	5, 240	5, 520	5, 830	6, 070
1036*e*		3, 650	5, 400	6, 050	6, 520	6, 920	7, 190	7, 610

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
—"	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
5,350	5,450	6,300	6,750	Sheared fibers.
8,100	8,280	9,480	10,300	Do.
8,000	8,100	8,900	9,800	Do.
15,000	15,320	18,400	19,500	Do.
17,980	18,160	20,900	22,400	Do.
14,880	15,250	18,200	19,400	Sheared fibers. Split at end.
7,350	7,680	9,480	10,600	Sheared fibers.
10,340	10,800	12,900	13,650	Do.
12,780	13,150	15,900	17,600	Indented with slight shearing of fibers.
12,370	12,780	15,500	17,700	Sheared fibers.
5,880	6,050	6,500	.....	Slight shearing of fibers. Split at end.
5,420	5,200	6,300	6,950	Slight shearing of fibers.
6,470	6,600	.....	.....	Slight shearing of fibers. Split at end.
7,070	7,200	8,680	.....	Do.
7,070	7,350	8,850	.....	Do.
7,580	7,780	9,370	9,950	Sheared fibers.
6,550	6,740	8,100	8,800	Do.
8,150	8,320	10,450	11,400	Slight shearing of fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1036*e*		3, 960	6, 250	7, 200	7, 750	8, 150	8, 400	8, 740
1049*a*		4, 620	6, 350	7, 050	7, 570	8, 050	8, 440	8, 880
281*e*		3, 550	4, 320	4, 500	4, 820	5, 150	5, 230	5, 520
281*ie*		2, 850	3, 900	4, 220	4, 550	4, 830	5, 100	5, 360
958*e*		3, 550	3, 680	3, 780	3, 940	4, 150	4, 370	4, 670
958*e*		2, 920	3, 680	4. 180	4, 440	4, 650	4, 880	5, 080
116*a*		5, 050	7, 250	8, 100	8, 900	9, 350	9, 980	10, 350
116*sa*		2, 950	4, 160	4, 500	4, 770	5, 000	5, 250	5, 460
116*sb*		2, 600	4, 380	4, 970	5, 440	5, 760	6, 160	6, 390
116*sa*		2, 450	5. 060	6, 040	6, 550	7, 020	7, 500	7, 900
314*a*		4, 400	5, 650	6, 650	7, 050	7, 420	7, 840	8, 080
314*b*		5, 050	6, 290	6, 780	7, 200	7, 610	8, 020	8, 300
428*a*		3, 700	6, 340	7, 380	7, 980	8, 470	8, 980	9, 260
133*e*		5, 700	8, 600	9, 650	10, 310	11, 050	11, 560	12, 250
133*e*		3, 250	6, 420	7, 950	9, 020	9, 710	10, 240	10, 760
380*a*		3, 700	5, 500	5, 770	5, 970	6, 320	6, 550	6, 680
533*f*		5, 250	6, 680	7. 180	7, 640	7, 980	8, 400	8, 800
533*f*		5. 150	7, 700	8, 720	9, 400	9, 970	10, 480	10, 980

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
9,060	9,440	10,950	11,800	Slight shearing of fibers.
9,440	9,850	12,100	12,950	Do.
5,870	6,050	.....	.....	Split at ends. Fibers not sheared. Specimen 4".7 long.
5,750	6,010	7,100	.....	Do.
5,070	5,190	6,550	7,400	Sheared fibers.
5,420	5,560	6,550	7,200	Sheared fibers.
11,100	11,460	.....	.....	Split at end. Fibers did not shear.
6,960	6,970	7,200	.....	Slight shearing of fibers. Split at end.
7,150	7,150	.....	.....	Do.
8,080	8,360	10,600	.....	Do.
8,560	9,080	10,700	.....	Do.
8,700	9,250	10,600	.....	Do.
8,890	10,300	12,400	13,500	Slight shearing of fibers.
10,100	13,380	16,100	16,950	Do.
13,100	12,300	15,200	16,800	Do.
11,880	.....	.....	.....	Sheared fibers.
7,260	9,700	11,800	12,800	Slight shearing of fibers.
9,450	12,250	14,200	15,950	Do.
11,810				

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*P*
758*e*		3, 080	4, 400	4, 970	5, 260	5, 620	6, 060	6, 300	
758*e*		3, 100	4, 280	4, 720	5, 180	5, 470	5, 780	6, 050	
918*a*		2, 500	3, 600	3, 900	3, 960	4, 350	.....	4, 650	
75*b*		3, 120	4, 100	4, 380	4, 680	4, 920	5, 160	5, 420	
75*b*		3, 100	4, 500	4, 950	5, 350	5, 680	5, 890	6, 170	
306*e*		5, 750	7, 700	8, 420	8, 900	9, 540	9, 990	10, 440	
306*e*		2, 450	5, 800	6, 620	7, 190	7, 690	8, 120	8, 530	
375*e*		3, 800	5, 950	6, 850	7, 500	7, 900	8, 460	8, 710	
375*e*		3, 850	6, 700	7, 900	8, 520	8, 980	9, 550	9, 810	
873*b*		3, 550	5, 960	6, 650	7, 000	7, 480	7, 850	8, 190	
873*b*		3, 860	6, 060	6, 670	7, 320	7, 860	8, 250	8, 760	
1111*e*		3, 540	6, 200	7, 150	7, 560	7, 830	8, 000	8, 250	
1111*e*		3, 480	6, 400	7, 360	7, 980	8, 620	8, 970	9, 500	
652*a*		4, 900	7, 700	8, 700	9, 260	9, 640	10, 000	10, 360	
486*b*		1, 410	2, 000	2, 160	2, 270	2, 370	2, 460	2, 560	
486		1, 150	1, 800	1, 900	1, 940	1, 950	1, 950	1, 970	
508*a*		2, 150	2, 380	2, 740	2, 930	4, 200	4, 450	4, 550	
132*a*		3, 860	5, 380	5, 950	6, 260	6, 450	6, 750	6, 970	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				
".09.	".10.	".15.	".20.	Effect on specimen.
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
6,850	7,080	8,650	9,600	Sheared fibers.
6,550	6,820	8,400	9,420	Slight shearing of fibers.
4,950	5,100	5,950	6,400	Sheared fibers.
5,820	6,000	.....	.....	Slight shearing. Split at end.
6,650	6,790	8,050	.....	Sheared fibers. Split at end.
10,980	11,420	13,750	15,300	Slight shearing of fibers.
9,280	9,570	11,950	13,300	Do.
9,460	9,590	11,500	12,850	Fibers did not shear.
10,620	10,900	12,900	14,100	Do.
8,960	9,060	10,750	11,700	Do.
9,510	9,800	11,300	12,400	Slight shearing of fibers.
8,570	8,700	10,250	.....	Slight shearing of fibers. Split at end.
10,200	10,490	12,500	13,650	Sheared fibers.
11,180	11,600	13,400	14,000	Do.
2,670	2,710	3,150	3,260	Do.
1,980	1,990	2,190	2,290	Sheared fibers. Specimen 4".7 long.
4,830	5,100	5,940	6,260	Sheared fibers.
7,320	7,480	8,450	9,050	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
132*b*		3, 900	5, 680	6, 070	6, 350	6, 590	6, 870	7, 200
1244*a*		3, 360	4, 350	4, 580	4, 780	4, 890	5, 040	5, 310
1245*a*		4, 320	5, 820	6, 150	6, 450	6, 650	7, 020	7, 160
1246*a*		4, 200	5, 100	5, 580	5, 900	6, 340	6, 760	7, 170
1255*e*		2, 410	4, 400	5, 350	5, 910	6, 160	6, 380	6, 590
1255*e*		4, 500	4, 880	5, 200	5, 670	6, 120	6, 360	6, 820
258*a*		6, 400	11, 200	12, 500	12, 610	12, 700	13, 250	13, 270
258*a*		5, 700	10, 450	11, 950	12, 360	12, 900	13, 380	13, 700
21*e*		3, 700	4, 640	5, 140	5, 480	5, 780	5, 960	6, 350
21*e*		3, 290	4, 370	4, 800	5, 160	5, 380	5, 690	5, 570
126*e*		2, 650	5, 300	6, 300	6, 700	6, 800	6, 910	7, 250
126*f*		3, 450	4, 710	5, 020	5, 240	5, 380	5, 620	5, 810
686*e*		2, 290	3, 010	3, 310	3, 480	3, 670	3, 850	4, 000
686*e*		1, 660	2, 360	2, 550	2, 770	2, 880	3, 070	3, 260
648*e*		2, 500	3, 650	4, 090	4, 380	4, 660	4, 830	4, 990
648*e*		2, 060	2, 950	3, 160	3, 350	3, 570	3, 710	3, 890
16		2, 400	3, 200	3, 320	3, 400	3, 550	3, 700	3, 790
16		2, 200	3, 400	3, 500	3, 680	3, 840	3, 970	4, 040

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".05"	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
7,870	7,810	8,900	9,960	Sheared fibers.
5,750	5,910	6,960	7,980	Sheared fibers. Split at end.
7,790	8,100	9,500	10,550	Sheared fibers.
8,050	8,190	9,800	10,900	Do.
6,970	7,340	8,750	9,500	Do
7,460	8,010	9,800	10,900	Do.
13,950	14,160	15,800	16,770	Do.
14,180	14,500	15,400	15,200	Sheared fibers. Split along grain from end to end.
6,820	6,980	8,850	9,750	Sheared fibers.
6,580	6,760	7,900	9,000	Slight shearing of fibers.
7,580	7,690	8,350	8,700	Sheared fibers.
6,090	6,230	7,250	.....	Sheared fibers. Split at end.
4,190	4,360	5,100	5,480	Sheared fibers.
3,480	3,590	4,450	4,850	Do.
5,300	5,500	6,380	6,710	Do.
4,160	4,260	5,100	5,600	Do.
3,990	4,100	4,690	5,050	Do.
4,380	4,490	5,250	5,710	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1057		2,250	3,750	4,100	4,290	4,460	4,580	4,690
76*a*		1,750	2,420	2,500	2,650	2,770	2,880	2,960
76*b*		2,260	2,770	3,000	3,250	3,560	3,650	3,770
76*a*		1,850	2,850	3,000	3,160	3,260	3,510	3,610
123*a*		1,550	2,200	2,430	2,500	2,580	2,670	2,740
393*a*		900	1,120	1,320	1,360	1,400	1,470	1,520
145*e*		1,650	2,600	2,900	3,100	3,220	3,290	3,500
112*a*		3,200	5,000	5,550	5,890	6,100	6,370	6,580
117*a*		3,440	4,900	5,280	5,470	5,680	6,040	6,120
318*a*		3,850	5,900	6,380	6,770	7,080	7,280	7,710
325*e*		3,900	6,040	6,440	7,100	7,470	7,930	8,340
951*e*		4,200	6,400	7,080	7,580	8,020	8,370	8,770
951*e*		3,900	5,880	6,400	7,000	7,360	7,720	8,150
407*a*		2,950	4,080	4,340	4,570	4,840	4,960	5,200
766*f*		3,260	4,300	5,400	5,980	6,370	6,620	6,880
766*f*		6,200	8,160	8,750	9,000	9,380	9,650	10,070
415*a*		4,450	7,650	8,650	9,250	9,560	9,920	10,150
415*b*		2,100	4,250	4,950	5,480	4,850	6,240	6,510

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
4,900	5,000	5,470	5,790	Sheared fibers.
3,070	3,220	3,680	3,950	Do.
3,980	4,070	4,600	.....	Sheared fibers. Split at end.
3,900	4,040	4,780	5,250	Sheared fibers.
2,860	2,870	3,260	3,380	Do.
1,580	1,680	1,910	2,060	Do.
3,680	3,780	4,400	.....	Sheared fibers. Split at end.
7,020	7,200	7,850	8,650	Sheared fibers.
6,420	6,580	7,600	7,970	Do.
8,180	8,530	9,700	10,450	Do.
8,720	8,910	9,750	.....	Sheared fibers. Split at end.
9,400	9,770	11,500	13,000	Do.
8,750	9,100	10,800	12,200	Slight shearing of fibers.
5,520	5,610	6,570	6,900	Sheared fibers.
7,480	7,620	9,100	10,000	Do.
10,470	10,560	12,100	12,650	Sheared fibers. Indented section contains two $\frac{1}{16}$" knots.
10,670	10,890	12,400	13,400	Sheared fibers.
6,950	7,250	8,560	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
672*a*		2, 300	4, 280	4, 880	5, 150	5, 380	5, 610	5, 780
672*b*		2, 580	4, 750	5, 440	5, 680	5, 860	6, 060	6, 190
322*a*		4, 250	7, 100	8, 550	9, 200	9, 750	10, 480	10, 900
322*e*		4, 300	6, 540	7, 250	7, 620	8, 050	8, 300	8, 610
326*e*		1, 750	4, 150	5, 300	6, 050	6, 550	6, 840	7, 060
326*e*		3, 950	6, 700	7, 600	8, 100	8, 400	8, 900	9, 250
3*e*		4, 850	7, 400	8, 480	8, 950	9, 620	10, 050	10, 400
3*e*		6, 500	9, 050	10, 000	11, 100	11, 550	12, 200	12, 900
1056*f*		5, 960	8, 850	9, 950	10, 840	11, 350	11, 950	12, 290
1056*f*		6, 600	9, 400	10, 250	10, 990	11, 800	12, 500	13, 050
29*a*		4, 950	8, 910	10, 100	11, 200	11, 800	12, 460	12, 900
1097*a*		5, 800	8, 800	10, 200	11, 180	11, 840	12, 600	12, 900
118*a*		4, 950	5, 980	7, 260	7, 980	8, 420	8, 780	9, 150
118*a*		4, 860	7, 150	7, 970	8, 460	8, 850	9, 150	9, 580
249*a*		3, 100	5, 950	7, 070	7, 780	8, 370	8, 720	9, 140
249*b*		6, 200	8, 950	9, 480	10, 050	10, 400	10, 770	11, 060
816*e*		3, 450	5, 760	6, 480	6, 840	7, 150	7, 600	7, 780
816*e*		3, 650	5, 710	6, 650	7, 050	7, 420	7, 740	8, 070

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
6,090	6,380	7,250	7,800	Sheared fibers. Split at end.
6,360	6,690	7,580	8,250	Sheared fibers.
11,900	12,250	13,650	.....	Slight shearing of fibers. Split at end. Shaky stick.
9,080	9,320	11,000	.....	Slight shearing of fibers. Split at end.
7,600	7,890	9,050	9,700	Indented without shearing fibers.
9,780	10,300	11,650	13,100	Slight shearing of fibers.
11,100	11,420	13,400	14,700	Slight shearing of fibers. 60 per cent. sap.
13,780	14,150	16,100	17,100	Do.
13,200	13,480	16,350	17,950	Indented without shearing fibers. Sap.
14,280	14,780	17,250	19,300	Do.
13,800	14,050	16,400	17,500	Do.
13,500	14,100	16,460	17,250	Slight shearing of fibers. 60 per cent. heart.
9,760	9,900	11,550	12,580	Sheared fibers. Split at end.
10,040	10,350	11,150	11,850	Sheared fibers.
9,840	10,160	11,900	13,300	Slight shearing of fibers.
11,670	12,020	14,300	15,000	Do.
8,300	8,560	10,000	10,900	Sheared fibers. Heart.
8,370	8,570	9,980	10,750	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
531*e*		4, 450	6, 900	8, 340	9, 200	9, 910	10, 550	10, 900
531*e*		3, 150	5, 420	6, 999	7, 980	8, 670	9, 180	9, 620
539*e*		5, 300	7, 280	8, 050	8, 490	8, 770	9, 450	9, 910
539*e*		3, 650	5, 680	6, 450	6, 840	7, 260	7, 720	8, 050
91*a*		4, 050	7, 300	8, 300	8, 650	8, 950	9, 270	9, 570
383*e*		6, 750	10, 200	11, 400	12, 300	13, 150	13, 780	14, 450
391*a*		4, 710	8, 460	9, 580	10, 660	10, 950	11, 560	12, 160
391*b*		7, 350	9, 600	10, 700	11, 550	12, 680	12, 780	13, 580
1082*a*		4, 950	8, 150	9, 350	10, 050	10, 620	11, 050	11, 380
1082*b*		3, 300	6, 620	7, 650	8, 320	8, 480	9, 280	9, 910
1164*a*		4, 850	8, 150	8, 940	9, 660	10, 100	10, 740	11, 150
1165*e*		3, 900	5, 500	6, 050	6, 260	6, 650	6, 800	7, 250
1166*e*		5, 250	8, 400	9, 550	10, 200	10, 650	11, 200	11, 620
1170*e*		5, 250	7, 700	8, 420	8, 980	9, 380	9, 940	10, 340
254*a*		5, 300	8, 350	9, 360	9, 900	10, 280	10, 650	11, 050
289*e*		5, 000	7, 150	7, 820	8, 280	8, 780	9, 260	9, 550
72*e*		6, 850	8, 900	9, 560	9, 980	10, 380	10, 970	11, 380
72*e*		4, 670	7, 100	8, 160	8, 620	9, 100	9, 460	9, 880

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
11, 890	12, 200	.....	.....	Fibers did not shear. Split along grain.
10, 460	10, 680	12, 600	.....	Fibers did not shear. Split at end.
10, 600	10, 890	12, 300	.....	Slight shearing of fibers. Split at end.
8, 770	9, 050	10, 700	11, 900	Slight shearing of fibers.
10, 180	10, 420	12, 100	12, 550	Sheared fibers. 10 per cent. heart.
15, 900	16, 400	18, 600	20, 200	Sheared fibers. 15 per cent. heart.
12, 690	13, 200	15, 500	16, 700	Slight shearing of fibers. 100 per cent. heart.
14, 400	14, 780	17, 250	19, 000	Do.
12, 180	12, 690	15, 200	16, 600	Fibers did not shear. Sap.
10, 720	11, 150	13, 450	14, 750	Sheared fibers. 20 per cent. heart.
11, 680	11, 640	14, 200	14, 800	Slight shearing of fibers. Heart.
7, 670	7, 780	8, 900	9, 900	Sheared fibers. Heart.
12, 300	12, 800	15, 300	16, 700	Slight shearing of fibers. 80 per cent. sap.
10, 990	11, 280	13, 300	14, 950	Slight shearing of fibers. Sap.
11, 640	11, 930	13, 900	14, 600	Sheared fibers. Sap.
10, 150	10, 380	.....	.....	Sheared fibers. Split at end. Specimen 4".7 long. Heart.
12, 070	12, 460	14, 700	15, 750	Sheared fibers. Sap.
10, 560	10, 820	12, 700	14, 350	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
348*a*		5,180	8,250	9,150	9,800	10,280	10,650	11,050
6*e*		5,600	9,080	10,050	10,700	11,400	11,700	12,150
6*e*		4,200	7,050	7,960	8,400	8,980	9,480	9,980
1051*a*		5,700	9,200	10,400	11,100	11,700	12,250	12,740
88*e*		6,500	9,700	11,000	11,850	12,480	13,060	13,460
88*e*		6,550	9,750	11,000	11,700	12,350	12,800	13,250
288*a*		3,600	5,930	8,100	9,450	10,500	11,550	12,190
1168*a*		4,500	8,250	9,440	9,980	10,250	10,800	11,170
1168*b*		5,400	9,200	10,350	10,860	11,350	11,600	12,300
121₁*a*		2,580	3,880	4,260	4,700	4,980	5,320	5,580
442*a*		4,500	7,900	9,240	9,980	10,650	11,150	11,650
538*c*		6,900	9,860	11,060	11,670	12,180	12,650	13,160
153*e*		2,900	6,050	7,450	8,150	8,440	8,890	9,140
153*e*		4,480	6,900	7,680	8,270	8,980	9,590	9,760
838*c*		4,700	6,600	7,300	7,660	7,980	8,270	8,620
838*c*		2,450	6,150	7,490	8,370	8,800	9,470	9,980
237*a*		3,950	8,100	9,890	10,800	11,450	11,950	12,420
237*b*		6,200	9,000	9,720	10,290	10,780	11,460	11,880

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
11, 950	12, 320	14, 850	15, 800	Sheared fibers. Sap.
12, 900	13, 080	14, 950	15, 800	Slight shearing of fibers. 60 per cent. heart.
10, 700	10, 980	.....	13, 580	Do.
13, 580	14, 050	16, 500	17, 850	Slight shearing of fibers. Heart.
14, 500	14, 900	17, 200	18, 800	Fibers did not shear. Sap.
13, 980	14, 480	17, 100	18, 700	Do.
13, 500	13, 930	16, 050	.....	Sheared fibers. Split along grain.
12, 150	12, 360	14, 850	15, 550	Slight shearing of fibers.
12, 960	13, 380	15, 500	16, 860	Do.
[illegible], 960	6, 280	7, 380	7, 900	Slight shearing of fibers. Split at end.
[illegible]0	12, 970	15, 100	16, 100	Slight shearing of fibers.
920	14, 070	16, 580	17, 740	Do.
, 800	10, 020	11, 850	12, 900	Do.
10, 500	10, 790	12, 650	13, 870	Do.
9, 150	9, 300	10, 980	12, 100	Do.
10, 8[illegible]0	11, 100	.....	.....	Slight shearing of fibers. Split at end.
13, 22[illegible]0	13, 590	16, 100	17, 650	Slight shearing of fibers.
12, 80[illegible]	12, 980	15, 200	16, 300	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01."	".02."	".03."	".04."	".05."	".06."	".07."
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
129*a*		3, 250	5, 880	6, 810	7, 540	7, 800	8, 200	8, 630
362*c*		6, 370	9, 830	11, 000	11, 650	12, 060	12, 900	13, 280
362*c*		4, 650	7, 200	8, 010	8, 620	8, 930	9, 250	9, 670
740*a*		5, 400	8, 880	10, 450	11, 520	12, 080	12, 560	13, 110
740*a*		5, 710	8, 880	10, 080	11, 050	11, 720	12, 400	12, 980
917*e*		3, 700	6, 400	7, 100	7, 640	7, 900	8, 240	8, 420
917*e*		3, 100	5, 750	6, 670	7, 090	7, 360	7, 660	7, 920
497*e*		5, 550	9, 450	10, 740	12, 000	12, 700	13, 100	13, 800
497*e*		4, 470	8, 180	9, 700	10, 680	10, 490	12, 050	12, 490
586*a*		2, 850	4, 250	4, 700	4, 900	5, 080	5, 480	5, 610
665*a*		2, 920	5, 400	6, 100	6, 560	7, 050	7, 380	7, 670
665*b*		3, 250	4, 920	5, 550	5, 980	6, 250	6, 450	6, 740
8*e*		2, 960	4, 290	4, 540	4, 890	5, 100	5, 190	5, 510
8*e*		4, 500	7, 140	7, 470	7, 690	7, 870	8, 010	8, 250
32*a*		5, 300	7, 910	8, 910	9, 800	10, 600	11, 200	11, 750
32½*a*		3, 050	4, 500	5, 050	5, 380	5, 650	5, 950	6, 320
32₁*a*		4, 300	5, 650	6, 690	7, 200	7, 450	7, 600	7, 900
49*a*		3, 400	6, 100	6, 900	7, 340	7, 830	8, 320	8, 460

TABLE 3.—INDENTATION TESTS—Continued.

Loads for indentations of—				Effect on specimen.
".05."	".10."	"15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
9,310	9,470	10,650	12,080	Sheared fibers.
13,910	14,160	15,850	17,100	Sheared fibers. Sap.
10,300	10,750	12,550	13,600	Do.
.....	14,350	16,650	17,400	Sheared fibers.
13,870	14,250	16,650	18,100	Do.
8,780	9,080	10,800	11,100	Do.
8,150	8,240	9,800	9,950	Do.
14,700	14,900	17,400	18,900	Do.
13,390	14,000	16,380	.....	Slight shearing of fibers. Split at end. Indented section covers a ⅜" knot.
5,080	6,080	7,300	8,170	Sheared fibers.
8,180	8,370	9,700	10,450	Sheared fibers. ½" knot in indented section.
7,180	7,450	8,480	9,200	Sheared fibers.
5,890	6,000	6,980	7,780	Do.
8,710	8,920	9,800	10,300	Do.
12,590	13,020	14,800	15,900	Do.
6,780	6,920	.....	.....	Slight shearing of fibers. Split at end.
8,220	8,420	9,300	10,250	Sheared fibers.
9,410	9,720	11,200	.....	Slight shearing of fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
49*b*		4,300	7,400	7,680	8,270	8,700	9,070	9,550	
49$_1$*a*		3,180	6,000	6,740	7,300	7,730	8,160	8,680	
49$_2$*a*		5,100	7,100	7,620	7,900	8,240	8,520	8,770	
49$_3$*a*		5,100	7,260	7,840	8,380	8,750	9,200	9,500	
113*a*		2,200	3,910	4,260	4,520	4,650	4,780	4,990	
113$_2$*a*		3,700	5,480	5,940	6,370	6,640	7,070	7,270	
113$_2$*b*		3,340	5,160	5,540	5,690	5,850	5,980	6,120	
238*a*		6,050	7,880	8,850	9,370	10,020	10,440	10,970	
238*b*		3,600	5,160	5,770	6,350	6,820	7,160	7,570	
250*b*		5,750	7,600	8,290	8,860	9,260	9,850	10,270	
250*b*		3,600	4,850	5,520	5,960	6,380	6,950	7,340	
251*e*		5,100	6,800	7,300	7,600	7,690	7,970	8,240	
251*e*		3,170	8,410	8,522	5,660	5,980	6,360	6,720	
259$_1$*a*		4,100	6,100	6,650	7,400	7,880	8,270	8,670	
259$_2$*a*		4,150	5,500	5,780	6,280	6,670	6,970	7,350	
403*e*		4,700	5,400	6,070	6,500	6,660	6,980	7,280	
403*e*		3,270	4,380	4,860	4,460	4,740	6,180	6,540	
443*a*		4,400	6,570	6,770	6,970	7,200	7,370	7,560	

TABLE 3.—INDENTATION TESTS—Continued.

[illegible]	LOADS FOR INDENTATIONS OF—			Effect on specimen.
[illegible]	".10.	".15.	".20.	
[illegible] Pounds.	Pounds.	Pounds.	Pounds.	
10, 300	10, 740	12, 900	13, 200	Sheared fibers.
9, 500	9, 880	11, 600	12, 300	Fibers did not shear.
9, 260	9, 470	10, 850	11, 800	Sheared fibers.
10, 330	10, 640	12, 500	13, 350	Do.
5, 220	5, 350	6, 040	6, 510	Do.
7, 680	7, 910	9, 300	9, 950	Do.
6, 680	6, 780	7, 570	8, 400	Do.
11, 740	12, 100	14, 580	15, 500	Slight shearing of fibers.
8, 300	8, 580	9, 920	.....	Slight shearing of fibers. Split at end.
11, 060	11, 450	13, 700	14, 900	Slight shearing of fibers.
.....	.....	.....	.....	Fibers did not shear. Split at end.
8, 570	8, 740	9, 600	10, 800	Sheared fibers.
7, 160	7, 400	8, 600	9, 700	Do.
9, 310	9, 470	11, 250	12, 400	Slight shearing of fibers.
7, 900	8, 140	.....	.....	Slight shearing of fibers. Split at end.
7, 090	7, 900	9, 370	.....	Sheared fibers. Split at end.
6, 960	7, 170	.....	.....	Split at end.
7, 870	8, 010	8, 900	9, 280	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*P*
547*e*		5,350	6,900	7,500	8,010	8,770	9,310	9,800	
547*e*		4,300	6,200	6,910	7,560	8,120	8,600	9,080	
748*f*		2,180	4,340	5,800	6,560	7,140	7,710	8,140	
749*e*		5,510	7,890	8,760	9,570	10,300	10,760	11,190	
749*e*		3,400	5,740	6,540	7,160	7,720	8,150	8,470	
895*e*		4,650	7,300	7,300	7,460	7,850	8,060	8,270	
895*e*		2,600	4,300	4 820	5,150	5,380	5,570	5,830	
1050*e*		5,100	8,000	8,820	9,480	10,000.	10,500	11,100	
1050*e*		4,280	5,950	6,700	7,240	7,800	8,200	8,610	
1257*e*		3,170	6,580	7,080	7,600	7,880	8,160	8,470	
1257*f*		4,900	6,300	7,250	7,650	7,960	8,270	8,580	
670*a*		3,050	4,900	5,690	6,170	6,650	7,120	7,470	
670*a*		4,100	5,420	5,920	6,310	6,640	7,010	7,290	
985*a*		5,100	7,390	7,970	8,460	8,880	9,220	9,580	
985*b*		4,500	6,610	7,250	7,680	8,250	8,610	9,160	
988*e*		5,280	7,700	8,250	8,560	8,870	9,360	9,490	
988*e*		4,180	5,900	6,160	6,570	6,960	7,180	7,550	
1027*b*		4,880	8,370	9,080	9,460	9,900	10,350	10 650	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
11,000	10,450	13,800	15,530	Slight shearing of fibers.
8,810	10,130	12,400	13,300	Slight shearing of fibers. Split at end.
		.....	.....	Split at end.
11,180	12,650	14,900	16,300	Indented without shearing fibers.
9,020	9,360	10,900	11,860	Do.
8,570	8,730	10,020	10,700	Sheared fibers. Split at side.
6,210	6,400	7,570	8,300	Sheared fibers.
11,620	12,060	14,780	15,950	Slight shearing of fibers.
9,38	9,710	11,900	13,100	Fibers did not shear.
9,070	9,360	10,780	11,850	Sheared fibers.
8,910	9,100	9,950	10,780	Sheared fibers.
8,210	8,470	10,180	.....	Fibers did not shear. Split at end.
7,910	8,180	9,550	10,700	Slight shearing of fibers. Split at end.
10,200	10,490	12,500	13,700	Sheared fibers.
9,760	9,980	12,300	12,960	Do.
9,980	10,260	11,750	13,000	Do.
8,100	8,360	9,650	10,570	Do.
11,300	11,580	13,500	14,550	Sheared fibers. Specimen split into two pieces, probably weakened by transverse test.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
1027*b*		3,500	6,100	7,280	7,860	8,350	8,700	9,060	
1029*a*		4,180	8,450	9,060	9,540	9,820	10,170	10,480	
1029*b*		1,950	5,060	6,200	6,420	6,790	6,890	7,190	
37*c*		4,950	7,240	7,750	8,250	8,800	9,400	9,780	
37*e*		4,250	7,440	8,780	9,500	10,150	10,770	11,160	
151*a*		7,400	10,060	11,060	11,540	12,300	12,860	13,470	
151*b*		3,570	5,900	7,310	8,300	9,030	9,820	10,500	
256*a*		4,680	7,450	8,470	9,320	9,870	10,450	10,900	
351*c*		5,700	8,400	9,340	9,880	10,320	10,740	11,160	
351*e*		3,410	5,400	6,100	6,440	6,850	7,310	7,550	
771*c*		4,960	7,670	8,570	9,060	9,490	9,980	10,270	
771*e*		5,500	8,660	9,700	10,370	10,800	11,220	11,700	
417*b*		4,100	6,140	6,860	7,580	8,210	8,670	9,370	
417*c*		3,920	6,550	7,180	7,780	8,360	8,900	9,300	
525*a*		4,480	7,600	8,450	8,910	9,360	9,780	10,050	
525*a*		5,050	8,260	9,140	9,650	9,980	10,240	10,610	
79*a*		4,720	6,180	6,660	7,220	7,680	8,040	8,380	
79*a*		4,880	6,740	7,350	7,650	8,010	8,260	8,630	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
9, 760	9, 910	11, 900	.....	Sheared fibers. Split at end.
11, 160	11, 450	13, 380	14, 080	Sheared fibers.
7, 770	8, 040	9, 500	.....	Sheared fibers. Split at end.
10, 470	10, 780	12, 700	13, 700	Slight shearing of fibers.
12, 280	12, 670	15, 000	16, 800	Do.
14, 290	14, 690	17, 100	17, 900	Do.
11, 770	12, 300	.....	.....	Fibers did not shear. Split at end.
690	12, 050	14, 100	15, 150	Slight shearing of fibers.
900	12, 100	14, 100	.....	Fibers did not shear. Split at end.
180	8, 420	9, 860	11, 000	Slight shearing of fibers.
1 [illegible] 880	11, 070	12, 860	12, 920	Sheared fibers.
12, 440	12, 590	14. 020	14, 550	Do.
16, 160	10, 380	12, 200	13, 250	Slight shearing of fibers.
16, 100	10, 370	11, 900	13, 210	Do.
16, 720	11, 060	13, 100	13, 900	Sheared fibers.
11, 170	11, 500	13, 460	14 400	Do.
8, 890	9, 040	10, 500	11, 400	Do.
9, 420	9, 590	11, 500	12, 360	Slight shearing of fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Marks on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
137*e*		5,900	8,570	9,570	10,620	11,390	11,910	12,460
143		1,650	5,990	7,020	7,540	7,910	8,360	8,670
310*e*		2,600	4,970	5,850	6,200	6,790	7,120	7,570
310*e*		3,700	6,150	6,570	6,910	7,400	7,790	8,140
857*e*		4,670	7,200	7,660	7,940	8,270	8,540	8,700
432*a*		4,500	6,250	6,470	6,980	7,480	7,770	8,020
831*a*		3,400	5,620	6,300	6,540	6,910	7,160	7,620
933*e*		3,900	6,280	6,940	7,410	7,680	8,080	8,330
933*e*		3,700	6,450	7,420	7,880	8,190	8,500	8,880
1071		4,580	7,840	8,810	9,560	10,150	10,900	11,100
1072*a*		6,050	7,620	8,050	8,680	9,150	9,570	9,960
1073		4,400	6,360	7,230	7,650	8,160	8,560	9,070
424*e*		6,300	9,920	11,440	12,360	12,890	13,660	14,050
424*e*		5,470	9,050	10,470	11,380	12,250	12,940	13,500
545*e*		3,200	3,960	4,560	4,970	5,340	5,770	6,150
545*f*		4,580	6,550	7,320	7,880	8,450	8,810	9,070
762*e*		4,500	5,800	6,450	7,010	7,420	7,780	8,070
62*e*		3,220	4,540	5,100	5,650	6,000	6,580	6,960

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
13, 300	13, 800	16, 600	17, 500	Slight shearing of fibers.
9, 210	9, 600	.....	.....	Split at ends. Short specimen 4".7 long.
8, 380	8, 620	10, 400	11, 300	Slight shearing. Split at ends.
8, 680	8, 880	10, 260	11, 360	Slight shearing.
9, 250	9, 470	11, 150	12, 200	Sheared fibers.
8, 640	8, 780	10, 760	11, 800	Do.
8, 280	8, 600	10, 340	.....	Slight shearing of fibers. Split at end.
8, 740	8, 960	10, 500	11, 150	Slight shearing of fibers.
9, 340	9, 510	11, 160	11, 700	Do.
11, 970	12, 300	14, 500	15, 750	Do.
10, 580	10, 940	13, 400	14, 700	Do.
9, 680	9, 950	11, 700	12, 800	Do.
14, 550	14, 820	17, 300	17, 900	Do.
14, 460	14, 760	16, 900	17, 800	Sheared fibers.
6, 750	6, 960	8, 200	.....	Slight shearing of fibers.
9, 780	10, 120	12, 000	12, 800	Sheared fibers.
8, 560	8, 670	10, 050	11, 000	Do.
7, 580	7, 920	9, 560	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Marks on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
12*e*		4,200	5,820	6,040	6,410	6,820	7,120	7,430
12*e*		2,960	4,570	5,120	5,500	5,900	6,270	6,560
54*a*		3,720	6,120	6,770	7,300	7,890	8,250	8,850
54*a*		.....	6,440	7,340	8,120	8,720	9,250	9,920
54a*a*		5,100	.....	7,780	8,120	8,360	8,690	8,780
54a*a*		3,590	5,220	5,700	6,050	6,470	6,820	7,160
846		4,610	7,140	8,050	8,640	9,250	9,800	10,150
846		4,300	7,050	7,900	8,500	8,920	9,450	10,200
755		6,740	8,060	9,020	9,880	10,460	11,000	11,400
755		4,100	6,600	7,570	8,480	9,200	9,720	10,300
524*e*		4,180	5,600	6,320	6,500	6,900	7,280	7,600
524*e*		2,650	4,520	5,160	5,670	6,120	6,460	6,870
240*a*		4,290	6,100	6,710	7,360	7,820	8,100	8,550
240*b*		5,200	6,680	7,500	8,200	8,770	9,150	9,880
31*a*		4,750	7,200	7,900	8,100	8,600	8,800	9,080
31a*a*		3,400	4,800	5,520	5,980	6,440	6,780	7,140
35*a*		4,100	7,610	8,090	8,910	9,480	9,990	10,200
434*a*		4,950	7,340	7,490	8,100	8,470	8,780	8,900

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
7,970	8,220	9,580	.....	Slight shearing of fibers. Split at end.
7,190	7,380	.....	.....	Do.
9,590	10,040	12,180	.....	Fibers did not shear. Split at end.
10,900	11,350	13,600	14,240	Slight shearing of fibers.
9,550	9,790	11,100	12,400	Sheared fibers.
7,780	8,070	9,600	.....	Slight shearing of fibers. Split at end.
10,900	11,240	13,180	14,240	Fibers did not shear.
10,960	11,370	13,500	14,900	Do.
12,380	12,770	15,100	16,300	Slight shearing of fibers.
11,300	11,670	13,800	15,050	Do.
8,200	8,470	9,660	.....	Fibers did not shear. Split at end.
7,440	7,630	8,880	9,550	Fibers did not shear.
9,140	9,500	11,200	.....	Slight shearing of fibers. Split at end.
10,690	11,040	13,800	14,500	Fibers did not shear
9,480	9,920	10,570	.....	Slight shearing of fibers. Split at end.
7,670	8,020	.....	.....	Split at ends.
10,950	11,600	12,460	.....	Sheared fibers.
10,540	10,960	11,000	11,050	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
925*a*		3, 200	5, 900	6, 700	7, 210	7, 570	7, 880	8, 200
925*b*		3, 650	6, 570	7, 330	7, 760	8, 200	8, 550	8, 880
34*a*		3, 500	6, 590	7, 300	7, 500	7, 850	8, 160	8, 470
34*aa*		3, 580	6, 980	7, 920	8, 340	8, 800	9, 250	9, 660
273*a*		5, 760	8, 480	9, 300	9, 910	10, 700	11, 250	11, 600
287*a*		4, 900	7, 380	8, 150	8, 710	9, 180	9, 670	10, 060
514*b*		5, 300	8, 800	9, 440	10, 050	10, 590	11, 120	11, 500
514		2, 580	6, 100	7, 550	8, 300	8, 750	9, 180	9, 780
688*a*		6, 100	10, 600	13, 100	14, 050	14, 800	15, 450	15, 980
688*a*		3, 900	8, 200	9, 900	11, 000	11, 600	12, 050	12, 780
655		3, 800	10, 400	13, 900	16, 200	17, 600	18, 600	19, 800
655		5, 200	9, 500	11, 400	12, 700	13, 400	14, 280	14, 980
698*a*		5, 450	9, 300	11, 000	11, 900	12, 850	13, 200	13, 700
1103*e*		4, 850	8, 440	9, 600	10, 200	10, 890	11, 180	11, 800
1103*e*		5, 800	8, 500	9, 550	10, 290	10, 810	11, 500	12, 050
404*a*		6, 900	12, 200	14, 200	14, 950	15, 700	16, 220	16, 700
799		3, 800	8, 250	9, 800	10, 850	11, 410	12, 060	12, 580
799		3, 750	6, 550	7, 890	8, 580	9, 370	9, 900	10, 480

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
8,770	8,980	10,200	.....	Sheared fibers. Split at end.
9,450	9,780	11,100	.....	Do.
8,870	9,150	10,650	11,680	Slight shearing of fibers.
10,380	10,740	12,580	.....	Slight shearing of fibers. Split at end.
12,500	12,870	15,500	17,100	Sheared fibers.
10,810	11,260	12,900	14,550	Sheared fibers. Indented section covers ½" knot.
12,300	12,670	15,400	16,400	Slight shearing of fibers.
10,400	10,750	12,850	13,600	Do.
17,100	17,480	19,900	21,900	Do.
13,700	14,100	16,900	18,500	Fibers did not shear.
21,400	22,000	25,500	28,500	Sheared fibers. Heart. Color, black.
15,250	15,680	.....	.....	Split at end. Sap.
14,600	14,940	17,350	.....	Split at end.
12,470	12,800	14,500	15,500	Slight shearing of fibers.
12,800	13,200	15,700	16,800	Do.
17,570	18,220	20,100	22,150	Sheared fibers.
13,460	14,070	16,900	18,550	Slight shearing of fibers.
11,650	12,220	15,300	16,900	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
919*a*		5,400	9,850	11,200	11,900	12,470	12,900	13,360
919*b*		3,900	7,300	8,500	9,140	9,780	10,080	10,850
954*b*		4,140	8,000	9,700	10,820	11,580	12,350	12,950
954*b*		3,550	6,600	8,310	9,150	9,680	10,460	11,140
649*a*		5,650	8,820	9,800	10,310	10,960	11,660	12,250
649*b*		3,600	9,100	10,850	11,950	12,400	13,150	13,540
653*e*		4,600	7,940	9,280	9,910	10,680	11,260	11,640
653*e*		4,210	7,620	8,770	9,620	10,750	10,960	11,570
654*a*		6,080	10,800	12,550	13,850	14,650	.....	16,100
663*a*		3,140	5,900	7,480	.....	8,950	9,650	10,200
663*b*		3,350	5,740	6,680	7,080	7,670	8,080	8,870
685*e*		5,100	8,500	9,820	10,700	11,150	11,950	12,440
685*e*		3,120	5,920	6,870	7,500	8,080	8,590	9,000
7*e*		3,610	5,060	5,500	5,940	6,390	6,960	7,200
7*e*		2,300	4,510	5,280	5,780	6,050	6,480	6,780
45_1a		2,390	4,060	4,310	4,380	4,680	4,920	5,060
45_2a		4,200	4,780	5,040	5,070	5,380	5,700	5,980
45_2b		1,920	3,640	4,310	4,470	4,710	5,040	5,100

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
13,960	14,360	16,450	17,200	Slight shearing of fibers. Split at end.
11,640	11,820	.....	.....	Split at end.
13,920	14,500	17,850	19,500	Slight shearing of fibers.
12,316	12,910	16,400	18,050	Do.
12,960	13,400	15,400	16,800	Do.
14 570	14,870	17,400	18,700	Do.
12,640	13,070	15,900	17,470	Do.
12,570	13,070	15,550	17,650	Do.
17,350	18,060	21,150	.....	Slight shearing of fibers. Split at end.
11,280	11,710	14,500	16,000	Slight shearing of fibers.
9,020	9,310	11,050	12,500	Do.
13,240	13,780	16,440	17,440	Do.
9,880	10,350	11,900	13,900	Do.
8,140	8,340	9,800	.....	Slight shearing of fibers. Split at end.
7,570	7,690	8,890	.....	Do.
5,470	5,590	6,520	7,400	Sheared fibers.
6,210	6,340	7,420	8,100	Do.
5,590	5,730	6,660	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01."	".02."	".03."	".04."	".05."	".06."	".07."
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
89*c*		3,960	6,560	7,480	8,120	8,580	8,890	9,610
89*e*		4,650	6,350	6,950	7,400	7,810	8,340	8,780
92*a*		4,700	5,600	6,310	6,550	6,990	7,450	7,810
140*a*		4,120	4,440	4,770	5,120	5,340	5,790	6,180
141*a*		3,700	4,970	5,230	5,550	5,910	6,140	6,490
146		3,920	5,680	6,000	6,300	6,670	6,990	7,260
215*e*		4,300	5,300	5,640	6,250	6,620	6,910	7,490
215*e*		2,450	4,950	5,580	6,100	6,390	6,780	7,040
217*e*		4,050	5,560	5,950	6,070	6,490	6,780	6,980
217*e*		3,900	5,410	5,890	6,190	6,590	6,880	7,080
218*e*		4,200	5,800	6,640	6,980	7,340	7,810	8,080
920*f*		3,440	4,210	4,800	4,470	4,720	4,870	4,990
920*f*		2,390	3,700	3,940	4,040	4,120	4,360	4,500
1043		3,450	4,670	5,330	5,620	6,100	6,410	6,580
1043		3,800	5,310	5,960	6,350	6,680	7,060	7,290
931*a*		5,500	8,400	9,550	10,520	10,960	11,580	11,920
931*b*		4,650	7,580	8,560	9,140	9,610	10,060	10,680
752*a*		2,470	5,570	6,390	6,770	7,130	7,580	8,100

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
10, 260	10, 700	12, 600	.....	Slight shearing of fibers. Split at end.
9, 600	9, 900	11, 900	.....	Do.
8, 490	8, 710	10, 050	11, 000	Sheared fibers.
6, 620	6, 780	8, 320	.....	Slight shearing of fibers. Split at end.
6, 900	7, 000	8, 340	8, 600	Sheared fibers.
7, 760	7, 960	9, 500	.....	Split at end.
8, 280	8, 680	11, 150	12, 900	Sheared fibers.
7, 480	7, 630	9, 180	.....	Sheared fibers. Split at end.
7, 470	7, 870	9, 400	.....	Split at end.
7, 610	7, 870	9, 400	.....	Do.
8, 370	8, 700	.....	.....	Split at end. Short specimen 4".7 long.
5, 190	5, 380	6, 380	6, 980	Sheared fibers.
4, 770	4, 870	5, 780	6, 320	Do.
7, 110	7, 280	.....	.....	Split at end.
7, 870	8, 000	9, 800	10, 700	Split at end. Fibers did not shear.
12, 590	12, 910	14, 480	16, 200	Sheared fibers. Split at end.
11, 580	11 860	14, 700	16, 400	Slight shearing of fibers.
8, 900	2, 170	11, 270	12, 600	Fibers did not shear.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	′.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
17*f*		4,480	5,100	5,500	6,200	6,350	6,720	6,780
17*f*		3,400	5,400	5,910	6,280	6,640	6,910	7,380
36*a*		3,610	5,560	6,150	6,640	6,970	7,450	7,770
36½*a*		5,100	6,980	7,400	7,810	8,100	8,250	8,780
36¾*a*		5,550	7,510	8,080	8,470	8,960	9,090	9,340
74*a*		3,450	7,200	8,800	9,780	10,400	11,050	11,900
74*b*		3,900	6,400	7,780	8,420	8,880	9,480	9,960
86*a*		4,250	6,300	6,900	7,120	7,460	7,910	8,400
244*a*		2,960	5,050	5,120	5,260	5,280	5,410	5,550
244*b*		1,840	3,460	3,600	3,690	3,860	4,060	4,140
247*b*		2,900	5,100	5,680	6,150	6,560	6,950	7,170
247		4,450	5,340	5,880	6,320	6,690	7,080	7,360
437*a*		3,410	5,020	5,470	6,010	6,350	6,900	7,040
628*a*		3,900	5,890	6,150	6,180	6,430	6,620	6,670
628*b*		3,620	5,500	5,910	5,980	6,120	6,370	6,600
963*a*		2,180	4,920	6,260	6,540	6,760	7,020	7,390
963*b*		2,710	4,100	4,720	5,100	5,230	5,540	5,700
268*a*		6,500	8,870	9,430	9,910	10,300	10,700	11,080

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				
″.09.	″.10.	″.15.	″.20.	Effect on specimen.
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
7,410	7,650	9,200	.....	Slight shearing of fibers. Split at end.
7,780	8,060	9,580	.....	Do.
8,260	8,500	9,900	.....	Do.
9,060	9,230	10,980	.....	Split at end. Fibers did not shear.
10,200	10,770	.....	14,400	Fibers indented without shearing.
12,040	13,550	15,900	17,560	Do.
10,880	11,250	13,850	.....	Split at end. Fibers did not shear.
8,960	9,250	10,900	.....	Split at end.
5,840	5,920	6,800	7,160	Sheared fibers. Split at end.
4,300	4,580	5,300	5,850	Sheared fibers.
7,880	8,080	.....	.....	Split at ends.
7,860	8,040	9,650	.....	Slight shearing of fibers. Split at end.
7,820	8,120	.....	10,800	Slight shearing of fibers.
6,920	7,110	8,180	8,900	Sheared fibers.
7,040	7,100	8,500	.....	Slight shearing of fibers. Split at end.
.....	.....	.....	.....	Split at ends. Shaky stick.
5,940	6,080	.....	.....	Do.
11,920	12,300	14,300	15,480	Slight shearing of fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.	″
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Po*
339		6, 100	9, 060	8, 840	9, 360	9, 900	10, 360	10, 760	1
131*a*		5, 150	7, 580	8, 160	8, 910	9, 400	10, 090	10, 850	1
131*b*		2, 150	4, 960	6, 170	6, 730	7, 240	7, 700	8, 080	
245*e*		4, 380	5, 280	5, 670	6, 000	6, 180	6, 520	6, 830	
245*e*		3, 100	4, 000	4, 160	4, 600	4, 950	5, 380	5, 780	
265*a*		3, 810	5, 650	6, 170	6, 360	6, 660	6, 900	7, 270	
265*a*		3, 050	5, 290	5, 770	6, 050	6, 250	6, 600	6, 890	
548*a*		5, 370	6, 510	7, 260	7, 690	8, 020	8, 440	8, 690	
548*a*		3, 860	6, 320	7, 160	7, 790	8, 150	8, 670	9, 060	
342*e*		4, 560	6, 070	6, 370	6, 760	7, 280	7, 560	7, 970	
342*e*		3, 950	5, 460	5, 960	6, 290	6, 670	7, 010	7, 280	
770*e*		3, 520	6, 120	7, 100	7, 850	8, 280	8, 950	9, 410	
770*e*		4, 670	7, 520	8, 610	9, 390	9, 920	10, 610	11, 180	1
47*a*		2, 950	5, 000	5, 820	6, 220	6, 470	6, 900	7, 060	
282*a*		5, 200	6, 480	6, 780	7, 370	7, 680	8, 190	8, 480	
282*b*		3, 210	4, 560	5, 060	5, 480	5, 960	6, 350	6, 700	
349*e*		3, 900	5, 900	6, 150	6, 920	7, 300	7, 680	8, 100	
'9*e*		3, 320	4, 950	5, 490	6, 050	6, 320	6, 750	7, 100	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
11, 600	11, 920	14, 100	.....	Sheared fibers. Split at end.
11, 500	11, 920	13, 700	.....	Slight shearing of fibers. Split at end.
8, 670	9, 060	10, 750	.....	Do.
7, 280	7, 550	.....	.....	Split at end.
6, 570	6, 950	8, 670	.....	Slight shearing of fibers. Split at end.
7, 710	7, 880	.....	.....	Split at end. Fibers did not shear.
7, 360	7, 580	9, 100	.....	Slight shearing of fibers. Split at end.
9, 210	9, 540	.....	.....	Do.
9, 670	9, 970	11, 500	.....	Do.
8, 560	8, 780	10, 550	11, 600	Sheared fibers.
7, 890	8, 130	9, 850	.....	Sheared fibers. Split at end.
10, 400	10, 650	12, 900	.....	Slight shearing of fibers. Split at end.
11, 170	12, 580	15, 250	16, 900	Sheared fibers.
7, 650	7, 800	9, 450	.....	Slight shearing of fibers. Split at ends.
9, 170	9, 540	.....	.....	Fibers did not shear. Split at ends.
7, 290	7, 480	9, 150	.....	Slight shearing of fibers. Split at ends.
8, 950	9, 300	.....	.....	Fibers did not shear. Split at ends.
7, 810	8, 050	9, 650	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
264$_{1}a$		3, 580	4, 650	4, 940	5, 200	5, 480	5, 570	5, 900
264$_{2}a$		3, 100	4, 060	4, 260	4, 600	4, 750	4, 880	5, 160
264$_{3}a$		3, 700	4, 310	4, 420	4, 620	4, 790	5, 060	5, 328
511e		3, 400	5, 920	6, 900	7, 660	8, 140	8, 680	9, 100
511e		2, 850	5, 100	6, 060	6, 640	7, 160	7, 480	7, 950
742b		6, 300	7, 740	8, 490	9, 250	9, 910	10, 540	11, 050
742b		3, 400	6, 450	7, 320	8, 560	9, 020	9, 510	9, 920
756a		6, 300	8, 300	9, 300	9, 880	10, 440	11, 100	11, 600
756a		3, 550	6, 700	7, 560	8, 200	8, 690	9, 180	9, 580
801e		3, 670	6, 570	7, 380	8, 100	8, 600	8, 950	9, 480
801e		3, 170	5, 920	6, 960	7, 580	8, 040	8, 480	8, 770
1171e		4, 350	5, 960	6, 440	6, 960	7, 360	7, 700	8, 050
1171e		2, 200	4, 140	4, 750	5, 050	5, 460	5, 770	5, 980
252a		.....	4, 700	5, 780	6, 520	7, 100	7, 440	7, 920
674a		3, 550	6, 500	7, 770	8, 310	8, 770	9, 240	9, 550
674a		4, 060	7, 500	9, 100	9, 890	10, 400	10, 900	11, 360
40se		4, 080	6, 950	7, 500	7, 960	8, 350	8, 750	9, 180
40se		2, 900	5, 700	6, 860	7, 570	8, 000	8, 550	8, 900

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
6, 280	6, 570	7, 740	.....	Slight shearing of fibers. Split at ends.
5, 410	5, 500	6, 500	.....	Do.
5, 720	5, 900	6, 880	.....	Sheared fibers. Split at ends.
9, 800	10, 200	12, 200	13, 250	Indented without shearing fibers.
8, 620	8, 900	11, 200	.....	Slight shearing of fibers. Split at end.
11, 940	12, 380	15, 100	16, 200	Sheared fibers.
10, 560	10, 910	12, 700	.....	Slight shearing of fibers. Split at end.
12, 480	12, 890	14, 850	16, 580	Sheared fibers.
9, 240	9, 620	-----	.....	Split at end. Fibers did not shear.
9, 980	10, 210	12, 460	13, 350	Slight shearing of fibers.
9, 500	9, 780	11, 600	.....	Slight shearing of fibers. Split at end.
8, 820	9, 120	11, 050	.....	Do.
6, 630	6, 870	8, 850	.....	Do.
8, 550	8, 860	-----	.....	Split at end.
10, 050	10, 300	12, 150	.....	Slight shearing of fibers. Split at end.
12, 100	12, 440	14, 600	15, 800	Sheared fibers.
9, 950	10, 360	12, 300	14, 150	Indented without shearing fibers.
9, 700	10, 080	12, 400	13, 700	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
50*a*		2,800	4,950	6,050	6,440	6,920	7,370	7,800
135		5,200	7,080	7,500	8,080	8,680	9,270	9,730
512*e*		3,550	6,250	7,160	7,560	7,960	8,380	8,710
512*e*		3,520	5,600	6,370	6,890	7,260	7,580	7,940
687*a*		3,950	6,480	6,950	7,460	7,900	8,160	8,460
687*b*		4,100	6,640	7,420	7,770	7,940	8,390	8,820
729		2,400	3,200	3,550	3,820	4,050	4,170	4,420
729		2,920	3,540	3,920	4,170	4,380	4,710	4,990
573*a*		2,700	3,200	3,850	3,910	4,320	4,470	4,810
573*b*		2,150	2,950	3,360	3,670	4,000	4,220	4,360
18*c*		2,950	3,250	3,620	3,850	4,220	4,450	4,670
18*c*		2,040	3,320	3,760	3,940	4,070	4,210	4,360
258*a*		1,960	2,830	3,140	3,360	3,550	3,720	3,870
258*aa*		1,920	3,220	3,610	3 780	3,920	4,100	4,190
516*a*		.....	2,380	2,710	2,860	2,970	3,200	3,370
9*b*		4,900	6,180	6,740	7,080	7,510	8,050	8,320
9*b*		3,200	4,900	5,590	5,980	6,300	6,880	7,250
44*aa*		2,450	6,050	6,550	6,970	7,240	7,650	7,980

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
.....	.....	.....	.....	Split at ends.
10, 680	11, 100	12, 950	.....	Do.
9, 270	9, 480	11, 400	12, 300	Indented without shearing fibers.
8, 550	8, 570	10, 650	11, 900	Slight shearing of fibers.
9, 000	9, 180	10, 800	12, 000	Sheared fibers.
9, 520	9, 780	11, 600	12, 650	Do.
4, 640	4, 790	5, 700	.....	Sheared fibers. Split at end.
5, 190	5, 420	6, 600	.....	Do.
5, 060	5, 280	.....	.....	Slight shearing of fibers. Split at end.
4, 700	4, 880	5, 750	.....	Do.
4, 910	4, 960	6, 410	6, 900	Sheared fibers.
4, 570	4, 680	5, 320	5, 630	Do.
4, 160	4, 260	4, 910	.....	Sheared fibers. Split at ends.
4, 490	4, 610	.....	.....	Sheared fibers. Split at end.
3, 630	3, 760	4, 500	.....	Do.
8, 900	9, 190	10, 700	12, 400	Sheared fibers.
7, 860	8, 080	9, 900	.....	Slight shearing of fibers. Split at end.
8, 370	8, 540	9, 680	10, 750	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
44*a*		5, 800	7, 040	7, 340	7, 770	8, 050	8, 320	8, 540
119*a*		4, 350	6, 040	6, 910	7, 160	7, 520	7, 830	7, 960
119*b*		4, 100	6, 100	6, 650	7, 260	7, 700	7, 920	8, 180
765*c*		3, 400	5, 050	5, 540	5, 960	6, 320	6, 600	6, 880
765*e*		3, 040	4, 680	5, 200	5, 490	5, 860	6, 070	6, 340
853*e*		3, 710	5, 350	5, 820	6, 250	6, 580	6, 880	7, 070
853*e*		3, 200	4, 940	5, 480	5, 920	6, 260	6, 600	6, 770
11*a*		4, 900	7, 390	8, 140	8, 740	9, 140	9, 540	9, 980
11*a*		3, 700	5, 270	5, 980	6, 380	6, 900	7, 060	7, 580
877*b*		4, 700	7, 650	8, 540	9, 160	9, 670	10, 190	10, 680
877*b*		4, 350	6, 700	7, 500	8, 200	8, 780	9, 300	9, 750
1047*e*		3, 410	5, 700	6, 360	6, 840	7, 380	7, 790	8, 220
1047		2, 900	5, 250	6, 040	6, 650	7, 020	7, 480	7, 910
46*a*		3, 400	5, 890	6, 470	6, 920	7, 340	7, 700	7, 950
73*e*		3, 950	6, 100	6, 640	7, 200	7, 750	8, 170	8, 720
73*e*		3, 310	5, 410	6, 140	6, 760	7, 580	7, 920	8, 380
1038*a*		2, 750	5, 680	6, 470	7, 040	7, 360	7, 920	8, 320
10*a*		2, 600	3, 570	3, 920	4, 070	4, 310	4, 530	4, 780
10*b*		2, 310	3, 410	3, 520	3, 750	3, 900	4, 140	4, 270

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
8,790	9,110	10,450	11,350	Sheared fibers.
8,630	8,840	10,100	11,000	Do.
8,660	8,890	.....	.....	Sheared fibers. Split at end.
7,380	7,620	9,150	10,100	Sheared fibers.
6,810	7,040	8,200	.....	Slight shearing of fibers. Split at end.
7,590	7,890	9,200	.....	Do.
7,580	7,830	9,100	.....	Do.
10,700	11,200	13,400	.....	Do.
8,320	8,650	10,700	.....	Do.
11,580	12,080	14,800	.....	Do.
10,600	10,820	13,100	.....	Do.
8,790	9,080	10,800	12,300	Slight shearing of fibers.
8,680	8,920	11,000	12,300	Do.
8,360	8,620	.....	.....	Split at ends.
9,420	9,600	12,100	13,250	Slight shearing of fibers.
9,080	9,360	11,700	.....	Sheared fibers. Split at end.
8,900	9,140	10,900	12,060	Sheared fibers.
5,120	5,270	6,550	7,050	Do.
4,580	4,790	.....	.....	Slight shearing of fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pound*
848*a*		3, 100	4, 900	5, 140	5, 310	5, 500	5, 620	5, 7
223		2, 600	3, 680	3, 940	4, 120	4, 260	4, 440	4, 6
223		1, 850	2, 410	2, 580	2, 920	2, 990	3, 220	3, 4
836*e*		2, 960	4, 280	4, 550	4, 880	5, 060	5, 380	5, 6
836*e*		2, 500	3, 750	4, 140	4, 470	4, 670	4, 960	5, 1
722*a*		3, 650	4, 350	4, 660	4, 930	5, 060	5, 270	5, 5
722*b*		2, 620	4, 360	4, 900	5, 200	5, 500	5, 840	6, 0
990		3, 050	4, 470	4, 780	5, 080	5, 270	5, 580	5, 9
990		2, 050	3, 260	3, 490	3, 720	3, 960	4, 110	4, 2
1065*e*		2, 800	.....	4, 550	5, 100	5, 350	5, 490	5, 6
1065*e*		2, 780	3, 850	4, 150	4, 420	4, 580	4, 810	5, 0
1066*e*		2, 150	2, 950	3, 370	3, 510	3, 770	3, 960	4, 1
1066*f*		2, 250	3, 280	3, 600	3, 780	4, 010	4, 170	4, 3
1067*e*		2, 600	3, 380	3, 650	3, 900	4, 170	4, 360	4, 7
1067*e*		1, 750	2, 920	3, 190	3, 480	3, 710	3, 890	4, 0
528*a*		2, 050	4, 050	4, 780	5, 160	5, 420	5, 730	5, 9
629*a*		1, 650	2, 910	3, 140	3, 380	3, 520	3, 680	3, 8
843		3, 850	5, 200	5, 700	6, 000	6, 320	6, 680	6, 8

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
5,960	6,060	7,800	.....	Slight shearing of fibers. Split at end.
4,870	4,970	5,900	6,400	Sheared fibers. Indented section covers ½" knot.
3,740	3,930	4,600	.....	Slight shearing of fibers. Split at end.
6,110	6,320	7,650	8,600	Slight shearing of fibers.
5,610	5,810	7,050	8,000	Slight shearing of fibers. Split at end.
6,020	6,170	7,350	8,300	Sheared fibers.
6,500	6,650	7,780	8,700	Slight shearing of fibers. Indented section covers ½" knot.
6,310	6,470	7,810	8,480	Sheared fibers.
4,610	4,800	5,900	6,600	Do.
6,060	6,170	7,250	.....	Sheared fibers. Split at end.
5,540	5,720	7,070	.....	Do.
4,470	4,660	5,650	6,300	Do.
4,570	4,850	5,880	.....	Slight shearing of fibers. Split at end.
5,080	5,270	6,480	7,400	Slight shearing of fibers.
4,460	4,590	5,660	.....	Slight shearing of fibers. Split at end.
6,310	6,460	7,380	8,050	Sheared fibers.
4,170	4,270	5,280	5,950	Slight shearing of fibers.
7,400	7,850	9,550	10,000	Do

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
843		3, 840	5, 780	6, 300	6, 750	6, 920	7, 300	7, 650
1068*e*		3, 370	4, 389	4, 880	5, 300	5, 460	5, 680	6, 020
1068*e*		2, 900	3, 900	4, 380	4, 780	5, 030	5, 170	5, 520
1069*f*		2, 680	4, 470	4, 970	5, 400	5, 660	5, 970	6, 080
1069*f*		2, 960	4, 160	4, 670	4, 970	5, 220	5, 470	5, 710
1070*e*		4, 060	5, 500	5, 950	6, 300	6, 500	6, 850	7, 100
1070*e*		2, 250	3, 400	3, 820	4, 080	4, 410	4, 700	4, 940
136*e*		2, 700	4, 780	5, 450	5, 920	6, 130	6, 370	6, 650
136*e*		2, 680	3, 300	3, 610	3, 880	4, 080	4, 370	4, 550
841		1, 960	2, 900	3, 620	3, 970	4, 240	4, 370	4, 510
841		1, 970	3, 040	3, 400	3, 680	3, 890	4, 090	4, 210
842*e*		3, 410	4, 680	4, 970	5, 240	5, 560	5, 790	5, 990
842*e*		2, 470	3, 340	3, 580	3, 830	4, 080	4, 180	4, 410
4*e*		4, 710	7, 850	9, 070	9, 670	10, 080	10, 480	11, 000
4*e*		3, 300	5, 380	5, 930	6, 380	6, 900	7, 120	7, 490
844*e*		3, 670	5, 920	6, 810	7, 350	7, 710	8, 200	8, 500
844*e*		2, 600	5, 150	6, 020	6, 680	7, 190	7, 520	7, 900
10		2, 800	3, 990	4, 260	4, 460	4, 560	4, 770	4, 890

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
8,070	8,320	9,750	10,120	Slight shearing of fibers.
6,350	6,610	8,050	.....	Sheared fibers. Split at end.
5,890	6,120	.....	.....	Slight shearing of fibers. Split at end.
6,610	6,770	7,960	.....	Sheared fibers.
6,000	6,170	.....	.....	Fibers did not shear. Split at end.
7,620	7,890	9,350	10,300	Sheared fibers.
5,430	5,660	6,900	.....	Fibers did not shear. Split at end.
6,970	7,090	8,250	8,850	Slight shearing of fibers.
5,020	5,170	.....	7,350	Sheared fibers. Split at end.
4,810	4,920	5,690	6,420	Sheared fibers.
4,420	4,590	5,650	6,170	Slight shearing of fibers.
6,380	6,590	8,100	9,050	Do.
4,720	4,860	5,870	6,500	Do.
11,500	12,000	14,100	15,250	Do.
8,060	8,410	10,200	.....	Do.
9,270	9,490	11,500	12,700	Do.
8,720	9,040	11,070	12,700	Do.
5,160	5,290	6,200	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pound*
967*e*		2,210	3,800	4,240	4,400	4,480	4,690	4,8
967		2,400	2,800	2,970	3,080	3,250	3,290	3,4
991*e*		3,910	4,550	4,900	5,240	5,470	5,670	5,8
991*e*		2,150	3,770	4,080	4,210	4,480	4,780	4,9
1025*a*		2,100	2,740	2,980	3,220	3,370	3,590	3,7
1025*b*		1,690	3,000	3,340	3,560	3,680	3,870	4,1
717*b*		1,390	2,100	2,300	2,360	2,380	2,470	2,5
717*b*		1,100	1,890	1,990	2,090	2,200	2,300	2,3
979*e*		1,300	2,080	2,320	2,390	2,480	2,630	2,6
979		1,470	2,270	2,450	2,590	2,710	2,840	2,9
635*a*		2,020	3,370	3,670	3,900	4,080	4,270	4,4
694*b*		2,050	2,400	2,470	2,650	2,770	2,870	3,
694*b*		1,450	2,070	2,200	2,380	2,470	2,560	2,
232*e*		2,000	2,850	3,080	3,460	3,590	3,790	4,
855*a*		1,420	2,190	2,520	2,860	3,000	3,180	3,
908*a*		2,100	2,390	2,650	2,760	2,970	3,070	3,
908*a*		2,300	2,690	3,000	3,170	3,260	3,410	3,
911*e*		1,100	2,000	2,240	2,370	2,570	2,720	2,

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				
[illegible]".	".10.	".15.	".20.	Effect on specimen.
Pounds.	Pounds.	Pounds.	Pounds.	
5,090	5,190	6,180	6,700	Sheared fibers.
3,590	3,670	4,260	4,500	Do.
6,190	6,460	7,880	8,620	Do.
5,180	5,350	6,350	7,050	Do.
3,960	4,210	4,970	.....	Sheared fibers. Split at end.
4,380	4,580	5,400	6,000	Sheared fibers.
2,720	2,820	3,180	3,410	Do.
2,570	2,710	3,300	3,630	Do.
2,970	3,060	3,680	4,100	Do.
3,170	3,270	3,700	4,140	Do.
4,700	4,850	5,480	5,920	Do.
3,180	3,280	3,890	4,550	Do.
2,890	2,960	3,580	3,910	Do.
4,280	4,480	5,280	.....	Slight shearing of fibers. Split at end. Short specimen 4".7 long.
3,620	3,820	4,750	5,550	Slight shearing of fibers.
3,470	3,570	4,450	4,920	Do.
3,820	4,000	4,780	5,400	Do.
3,070	3,200	3,910	4,420	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pound*
911*c*		.....	2,100	2,240	2,380	2,410	2,610	2,
690*a*		1,950	2,900	3,140	3,280	3,460	3,640	3,
690*b*		2,650	4,080	4,380	4,680	4,890	5,040	5,
640*a*		2,500	3,300	3,440	3,570	3,690	3,880	3,
981*a*		2,270	2,660	2,800	3,060	3,190	3,410	3,
981*b*		1,400	1,940	2,080	2,240	2,380	2,470	2,
889*a*		2,190	2,440	2,580	2,790	2,890	3,050	3,
721*a*		1,480	2,710	3,040	3,260	3,450	3,560	3,
721*e*		1,710	2,760	3,080	3,450	3,520	3,690	3,
972*a*		1,900	2,250	3,050	3,560	3,700	3,790	3,
972*b*		2,250	3,720	4,370	4,780	5,230	5,480	5,
966*e*		2,350	3,370	3,600	3,760	3,900	4,080	4,
669*a*		3,100	4,080	4,550	4,780	4,940	5,050	5,
1177*e*		1,550	1,960	2,160	2,310	2,410	2,560	2,
1177*f*		1,790	2,890	3,090	3,250	3,420	3,480	3,
272*a*b		2,090	2,500	2,650	2,770	2,820	2,890	2,
272*a*b		1,450	1,620	1,630	1,670	1,700	1,780	1,
1035*a*		1,810	3,080	3,450	3,610	3,770	3,870	4,

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
"—.09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
2,880	2,980	3,580	4,040	Slight shearing of fibers.
4,240	4,300	5,280	5,920	Sheared fibers.
5,520	5,710	6,700	7,450	Do.
4,170	4,250	4,880	5,120	Sheared fibers.
3,690	3,780	4,480	4,920	Do.
2,790	2,870	3,460	3,920	Do.
3,380	3,480	4,200	4,800	Slight shearing of fibers.
4,040	4,110	4,700	.....	Slight shearing of fibers. Split at end.
4,090	4,250	5,100	5,850	Sheared fibers.
4,450	4,580	5,470	.....	Slight shearing of fibers. Split at end.
6,020	6,300	7,300	7,850	Sheared fibers. Split at end. Indented section covers ¼-inch knot.
4,560	4,670	5,600	.....	Slight shearing of fibers. Split at end.
5,550	5,720	6,550	7,300	Sheared fibers.
2,860	2,970	3,660	4,100	Sheared fibers. Split at end.
3,780	3,880	4,480	5,050	Sheared fibers.
3,070	3,080	3,550	3,850	Do.
1,900	1,980	2,260	2,450	Do.
4,390	5,000	5,700	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pound*
1035*b*		1,900	2,660	2,780	2,900	3,010	3,110	3,2
847*e*		1,410	1,950	2,060	2,160	2,270	2,370	2,4
847*e*		1,450	1,860	1,940	1,990	2,110	2,200	2,2
522*e*		1,950	2,390	2,610	2,840	3,050	3,170	3,3
961*a*		1,800	2,400	2,480	2,600	2,730	2,840	2,9
961*b*		1,950	2,270	2,370	2,480	2,570	2,570	2,6
1054		1,960	2,080	2,320	2,460	2,550	2,640	2,7
1054		1,150	1,610	1,780	1,880	1,990	2,110	2,2
552*a*		1,000	2,080	2,450	2,570	2,700	2,880	2,9
1012*a*		1,650	2,000	2,210	2,300	2,380	2,470	2,5
1012*b*		1,110	1,570	1,750	1,800	1,960	2,060	2,0
1028*a*		2,050	2,200	2,410	2,570	2,680	2,820	2,9
1028*b*		990	1,570	1,740	1,880	1,960	2,070	2,2
255*a*		.....	1,290	1,440	1,500	1,600	1,690	1,7
304*a*		900	1,340	1,510	1,600	1,720	1,830	1,9
304*b*		1,470	1,980	2,070	2,160	2,200	2,300	2,3
309*a*		3,500	4,970	5,280	5,370	5,490	5,660	5,7
309*a*		1,150	2,300	2,350	2,710	2,900	2,990	3,1

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimens.
.09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
3,460	3,480	4,100	4,450	Sheared fibers.
2,480	2,670	3,250	3,650	Do.
2,490	2,580	3,090	3,380	Do.
3,00	3,630	4,320	.....	Sheared fibers. Split at end. Specimen 4.7" long.
2,970	3,120	3,640	3,950	Sheared fibers.
2,780	2,880	3,280	3,660	Do.
2,910	3,000	3,650	4,150	Do.
2,390	2,490	2,900	3,380	Slight shearing of fibers.
3,080	3,180	3,680	4,200	Do.
2,700	2,780	3,250	3,570	Sheared fibers.
2,270	2,290	.....	.....	Slight shearing of fibers. Split at end
3,150	3,250	.....	.....	Do.
2,390	2,480	3,050	.....	Do.
1,880	1,930	2,270	2,600	Sheared fibers.
2,090	2,170	2,600	.....	Slight shearing of fibers. Split at end
2,570	2,640	2,900	3,200	Sheared fibers.
6,070	6,190	7,280	.....	Slight shearing of fibers. Split at end.
3,390	3,520	4,480	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
754*c*		1,900	2,910	3,280	3,400	3,590	3,720	3,970
754*e*		1,850	2,520	2,690	2,880	2,980	3,080	3,180
659*e*		2,060	2,680	2,890	2,980	3,170	3,340	3,460
659*e*		1,550	2,200	2,600	2,760	2,920	3,060	3,180
646*a*		4,550	6,550	6,930	7,090	7,290	7,440	7,540
646*b*		1,440	2,480	2,690	2,950	3,080	3,240	3,470
909*a*		2,470	2,890	3,110	3,170	3,380	3,610	3,790
909*b*		1,450	2,040	2,340	2,440	2,620	2,730	2,820
912*e*		1,400	1,840	1,940	2,050	2,150	2,240	2,360
912*e*		1,800	2,320	2,460	2,600	2,740	2,840	2,950
634*a*		2,360	2,600	2,680	2,800	2,900	3,010	3,090
634*b*		2,220	2,650	2,830	3,190	3,240	3,290	3,390
662		2,100	2,940	3,070	3,290	3,380	3,480	3,570
662*e*		2,360	3,980	4,030	4,110	4,250	4,410	4,600
379*a*		1,150	1,550	1,640	1,730	1,790	1,840	1,930
379*b*		1,120	1,550	1,580	1,590	1,610	1,630	1,660
782*e*		1,810	2,230	2,420	2,460	2,560	2,590	2,650
782*e*		1,080	1,890	1,980	2,060	2,070	2,090	2,130

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
4,180	4,290	4,900	.....	Sheared fibers. Split at end.
3,370	3,470	4,050	.....	Do.
3,670	3,810	4,600	.....	Do.
3,500	3,630	4,460	.....	Do.
7,780	7,880	8,900	.....	Do.
3,800	3,980	4,800	5,500	Sheared fibers.
3,970	4,120	4,800	.....	Slight shearing of fibers. Split at end.
3,080	3,180	3,750	4,040	Sheared fibers. Split at end.
2,570	2,670	3,100	3,550	Do.
3,190	3,280	3,880	.....	Do.
3,180	3,230	3,590	3,900	Sheared fibers.
3,490	3,520	3,940	4,180	Do.
3,770	3,860	4,280	4,510	Sheared fibers. Split along indented face.
4,960	5,070	5,780	.....	Sheared fibers. Split at end.
1,990	2,170	2,280	2,500	Sheared fibers.
1,760	1,780	2,060	2,190	Do.
2,780	2,800	3,150	3,400	Do.
2,180	2,220	2,460	2,710	Sheared fibers. Split along indented face.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
783*a*		1,370	1,940	2,090	2,220	2,270	2,280	2,350
783*a*		1,090	1,810	2,150	2,280	2,360	2,380	2,430
790*e*		1,390	2,180	2,240	2,270	2,330	2,370	2,440
790*e*		1,500	1,850	2,060	2,110	2,180	2,240	2,270
792*e*		1,210	1,590	1,690	1,740	1,790	1,880	1,930
792*e*		890	1,320	1,380	1,400	1,430	1,460	1,490
796*e*		1,480	1,910	2,000	2,120	2,210	2,300	2,370
796*e*		1,550	1,920	1,980	2,070	2,170	2,260	2,280
874*a*		1,310	1,740	1,780	1,910	1,970	2,000	2,050
874*a*		1,580	2,100	2,190	2,260	2,290	2,310	2,330
1099*a*		1,260	2,080	2,280	2,370	2,390	2,480	2,560
1099*b*		1,450	1,960	2,100	2,240	2,330	2,440	2,540
1017*e*		1,570	1,770	1,980	2,020	2,170	2,280	2,360
1017*e*		2,380	2,400	2,450	2,900	3,120	3,310	3,300
1021*a*		1,250	1,510	1,660	1,770	1,860	1,890	1,980
1021*b*		2,160	2,530	2,440	2,520	2,670	2,790	2,840
350*e*		750	1,280	1,600	1,680	1,770	1,790	1,870
350		1,410	2,170	2,280	2,370	2,460	2,570	2,670

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
2,400	2,450	2,740	2,840	Sheared fibers.
2,470	2,500	2,680	2,740	Sheared fibers. Indented section covers ¼" knot.
2,490	2,560	2,890	3,280	Sheared fibers.
2,370	2,420	2,680	2,920	Do.
1,970	2,010	2,300	2,370	Do.
1,530	1,560	1,750	1,850	Do.
2,550	2,580	3,080	3,320	Do.
2,370	2,430	2,780	2,920	Do.
2,110	2,160	.....	.....	Sheared fibers. Split at end.
2,400	2,460	2,680	2,850	Sheared fibers.
2,690	2,800	3,300	3,550	Do.
2,760	2,790	3,190	3,400	Do.
460	2,560	.....	.....	Slight shearing of fibers. Split at end.
100	3,050	3,850	3,900	Sheared fibers.
070	2,130	2,460	.....	Sheared fibers. Split at end.
[illegible]	3,050	3,480	3,810	Sheared fibers.
1,930	1,960	2,220	2,480	Do.
2,300	2,800	3,200	3,470	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
850*e*		1,500	1,960	2,070	2,120	2,190	2,270	2,340
850*e*		1,380	2,100	2,510	2,610	2,740	2,820	2,850
851*e*		1,020	1,620	1,900	1,920	1,940	1,970	1,990
851*e*		1,150	1,540	1,770	1,810	1,840	1,850	1,860
852*e*		1,420	2,260	2,630	2,900	3,010	3,120	3,250
852*e*		1,200	2,150	2,480	2,890	2,990	3,110	3,270
969		1,210	1,950	2,140	2,230	2,260	2,330	2,410
969		1,150	1,710	2,190	2,310	2,380	2,470	2,570
983*b*		1,590	2,580	2,870	3,070	3,280	3,410	3,500
983*a*		2,050	3,510	3,940	4,060	4,100	4,230	4,340
994*e*		1,650	2,750	2,910	3,070	3,180	3,290	3,410
994*e*		2,480	3,180	3,340	3,520	3,710	3,820	3,910
1000*e*		3,400	4,480	4,670	4,860	4,970	5,070	5,190
1000		2,910	4,050	4,370	4,570	4,660	4,770	4,880
701*a*		1,910	3,150	3,350	3,370	3,480	3,480	3,640
707*e*		1,520	2,100	2,380	2,470	2,580	2,670	2,710
707*e*		1,410	2,180	2,460	2,560	2,650	2,660	2,790
675*b*		3,650	7,300	.....	8,250	8,510	8,710	8,930

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
2,450	2,470	2,880	3,200	Sheared fibers.
2,900	2,930	3,150	3,150	Do.
2,090	2,120	2,280	2,400	Do.
1,940	1,960	2,200	2,380	Do.
3,450	3,550	3,980	4,350	Slight shearing of fibers.
3,480	3,620	4,250	4,700	Do.
2,490	2,550	2,880	3,100	Sheared fibers.
2,680	2,720	3,100	3,350	Slight shearing of fibers.
3,800	3,880	4,470	.....	Sheared fibers. Split at end.
4,480	4,600	5,100	.....	Slight shearing of fibers. Split at end.
3,630	3,720	4,400	.....	Do.
4,100	4,180	4,880	.....	Slight shearing of fibers. Split at end. $\frac{1}{2}$" knot.
5,470	5,540	6,250	6,600	Sheared fibers.
5,070	5,140	5,700	6,150	Do.
3,810	3,850	4,250	4,750	Do.
2,880	2,930	.....	.....	Split along grain.
2,920	3,000	.....	.....	Do.
9,230	9,290	10,400	10,950	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
675*b*		3, 900	7, 200	7, 740	7, 980	8, 210	8, 370	8, 510
691*a*		3, 100	5, 600	6, 650	7, 300	7, 550	7, 750	8, 040
691*b*		3, 980	5, 320	5, 640	5, 670	5, 840	5, 890	5, 960
1100*e*		1, 310	3, 470	4, 670	5, 300	5, 650	5, 790	5, 910
1100		3, 810	5, 350	5, 640	5, 780	6, 110	6, 290	6, 490
624		2, 960	5, 360	6, 450	6, 910	7, 060	7, 290	7, 480
624		3, 550	5, 420	5, 780	5, 910	6, 080	6, 230	6, 390
939*e*		3, 920	7, 920	9, 460	10, 240	10, 620	10, 900	11, 250
939*e*		3, 250	6, 910	8, 920	9, 610	9, 950	10, 250	10, 700
1102*a*		3, 850	7, 500	8, 890	9, 400	9, 730	10, 200	10, 420
327*e*		2, 400	4, 440	4, 560	4, 820	4, 960	5, 080	5, 160
327		2, 660	4, 260	4, 700	4, 810	4, 880	4, 930	4, 960
734*a*		3, 500	5, 250	5, 950	6, 270	6, 370	6, 470	6, 680
800*e*		2, 800	3, 880	4, 340	4, 470	4, 590	4, 670	4, 760
800		3, 050	4, 610	5, 050	5, 160	5, 210	5, 410	5, 480
837*e*		1, 850	3, 170	3, 490	3, 760	3, 820	3, 890	3, 920
837*e*		1, 800	2, 820	3, 140	3, 330	3, 380	3, 470	3, 480
1055		2, 340	4, 250	4, 950	5, 420	5, 550	5, 600	5, 670

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	"..10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
8,850	8,990	.....	.....	Sheared fibers. Split at end.
8,340	8,470	9,350	9,980	Slight shearing of fibers. Indented section covers two ½" knots.
6,180	6,220	.....	.....	Slight shearing of fibers. Split at corner.
6,170	6,210	6,980	7,380	Sheared fibers.
6,820	6,910	7,950	8,600	Do.
7,680	7,750	8,560	.....	Sheared fibers. Split at ends. Worm-eaten.
6,650	6,820	7,880	8,820	Sheared fibers. Worm-eaten.
11,510	11,670	13,200	13,900	Sheared fibers.
11,200	14,700	.....	.....	Sheared fibers. Split at end.
10,800	10,940	12,300	.....	Sheared fibers. Split at ends.
5,400	5,520	6,600	7,060	Sheared fibers.
5,160	5,180	5,700	.....	Sheared fibers. Split at end.
6,820	6,920	7,580	.....	Do.
4,880	5,040	5,570	5,890	Sheared fibers.
5,720	5,750	6,590	7,100	Do.
3,990	4,020	4,300	4,570	Do.
3,640	3,670	4,140	4,400	Do.
5,340	5,910	6,680	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1,249*a*		3,500	6,150	6,760	7,080	7,350	7,590	7,880
1,250*a*		2,650	5,300	5,940	6,260	6,580	6,700	6,950
535*e*		1,090	1,780	1,910	2,020	2,070	2,210	2,350
535*f*		990	1,690	1,850	1,960	2,030	2,080	2,220
542*e*		1,950	3,140	3,520	3,700	3,840	3,940	4,020
542*e*		1,960	2,690	2,880	2,980	3,120	3,270	3,370
741*e*		1,920	2,300	2,920	3,200	3,270	3,370	3,460
741		1,960	2,470	2,650	2,770	2,910	2,990	3,120
657*e*		1,850	2,100	2,160	2,270	2,390	2,420	2,500
657*e*		1,900	2,100	2,140	2,320	2,420	2,570	2,700
710		1,240	1,880	2,080	2,100	2,170	2,210	2,280
711*a*		1,720	2,280	2,350	2,370	2,380	2,390	2,440
711*b*		1,380	1,690	1,940	2,070	2,090	2,200	2,290
712*a*		1,360	1,720	1,810	1,910	1,980	2,060	2,080
712*b*		1,550	2,310	2,340	2,200	2,100	2,150	2,120
713*e*		1,890	2,880	2,450	2,460	2,620	2,920	3,070
713*f*		1,650	1,850	1,920	2,030	2,110	2,210	2,360
715*a*		3,910	5,380	6,020	6,290	6,450	6,620	.....

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
8,100	8,200	9,400	.....	Slight shearing of fibers. Split at end.
7,260	7,380	8,600	9,250	Sheared fibers.
2,510	2,590	2,940	.....	Sheared fibers. Split at end.
2,320	2,380	2,750	2,950	Slight shearing of fibers.
4,200	4,280	4,860	.....	Slight shearing of fibers. Split at end.
3,500	3,570	4,150	4,600	Sheared fibers. Split at corner.
3,570	3,620	3,960	4,260	Sheared fibers.
3,270	3,370	3,950	4,380	Do.
2,560	2,610	2,910	3,220	Do.
2,930	3,180	3,360	3,750	Do.
2,280	2,340	2,600	.....	Sheared fibers. Split at end.
2,630	2,690	3,020	3,200	Sheared fibers. Split along grain.
2,290	2,310	.....	.....	Slight shearing of fibers. Split along grain.
2,170	2,220	2,460	.....	Sheared fibers. Split along grain.
2,370	2,420	2,680	2,880	Sheared fibers.
3,240	3,310	3,600	3,950	Do.
2,420	2,470	2,790	.....	Sheared fibers Split at end.
.....	.....	.....	.....	

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	"03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds*
978*a*		5,200	8,080	8,550	8,870	9,150	9,380	9,67
978*b*		4,900	8,050	8,900	9,150	9,470	9,610	9,78
62*a*		3,650	5,140	5,760	6,250	6,550	6,880	7,20
62*a*		2,250	5,160	6,260	6,690	6,890	7,210	7,42
277*e*		2,800	3,870	3,600	3,710	3,840	3,960	4,08
277		2,770	4,240	4,670	4,870	4,970	5,100	5,17
651*b*		2,250	3,200	3,590	3,770	3,980	4,060	4,18
651*b*		2,360	3,850	4,280	4,520	4,670	4,860	4,96
1*e*		2,100	2,500	2,670	2,780	2,860	2,970	3,02
1*e*		1,410	2,450	2,960	3,070	3,190	3,270	3,33
222*a*		2,200	3,400	4,150	4,300	4,600	4,910	5,08
777*e*		1,150	1,950	2,310	2,370	2,450	2,460	2,47
777*e*		.....	.....	2,100	2,120	2,160	2,230	2,25
788*b*		1,480	2,120	2,300	2,380	2,480	2,570	2,66
788*b*		1,740	2,050	2,270	2,370	2,470	2,560	2,66
789*b*		1,100	1,560	1,680	1,770	1,860	1,880	1,91
789*b*		1,160	1,720	1,950	2,010	2,080	2,110	2,16
797*b*		2,050	2,370	2,540	2,660	2,780	2,910	3,06

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
10, 170	10, 420	11, 950	12, 900	Sheared fibers.
10, 100	10, 210	11, 250	12, 100	Do.
7, 690	.....	.....	.....	Split at ends.
7, 750	8, 070	9, 450	9, 980	Sheared fibers. Split at ends.
4, 280	4, 330	4, 950	5, 320	Sheared fibers.
5, 260	5, 380	5, 980	.....	Sheared fibers. Split at end.
4, 510	4, 600	5, 470	5, 900	Do.
5, 080	5, 160	5, 700	6, 100	Sheared fibers.
3, 150	3, 190	3, 500	3, 920	Do.
3, 390	3, 420	3, 800	3, 900	Sheared fibers. Split at end.
5, 410	5, 650	6, 550	6, 900	Slight shearing of fibers.
2, 540	2, 560	2, 800	2, 930	Sheared fibers.
2, 410	2, 450	2, 800	3, 050	Do.
2, 750	2, 860	3, 350	3, 680	Do.
2, 800	2, 850	3, 140	.....	Sheared fibers. Split at ends.
1, 980	2, 030	2, 300	2, 550	Sheared fibers.
2, 260	2, 290	2, 590	2, 800	Do.
3, 280	3, 350	3, 950	4, 460	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
797		1,170	1,900	2,080	2,140	2,170	2,260	2,280
1044*a*		1,910	2,680	2,760	2,870	2,910	2,970	3,020
1044*a*		1,300	1,990	2,120	2,160	2,210	2,310	2,360
975		1,500	2,100	2,320	2,410	2,510	2,620	2,720
987*e*		1,570	1,920	2,120	2,260	2,370	2,470	2,560
987*e*		1,460	1,890	2,040	2,150	2,200	2,280	2,370
638*a*		1,180	2,280	2,680	2,810	2,890	2,950	2,990
668*a*		2,460	2,890	2,950	3,100	3,170	3,270	3,300
730*b*		1,450	1,920	2,080	2,120	2,170	2,250	2,340
819*e*		1,460	2,800	3,100	3,270	3,370	3,470	3,560
819		1,490	2,870	3,360	3,570	3,610	3,740	3,810
913*a*		2,420	3,680	4,020	4,310	4,440	4,670	4,790
992*a*		2,350	3,620	3,960	4,170	4,260	4,460	4,570
992*b*		1,910	2,920	3,100	3,250	3,310	3,400	3,490
661*b*		2,780	3,770	4,200	4,350	4,480	4,570	4,680
661*b*		2,500	4,100	4,260	4,420	4,350	4,670	4,810
656*e*		4,460	5,900	6,960	7,150	7,520	7,760	7,960
656*e*		3,900	5,260	5,750	6,030	6,260	6,450	6,610

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
2, 460	2, 530	2, 850	3, 080	Sheared fibers.
3, 080	3, 130	3, 370	3, 530	Do.
2, 410	2, 460	2, 740	3, 000	Do.
2, 890	2, 970	3, 410	.....	Sheared fibers. Split at end.
2, 610	2, 690	3, 140	3, 450	Sheared fibers.
2, 470	2, 520	2, 850	3, 050	Do.
3, 140	3, 210	3, 550	3, 800	Do.
3, 410	3, 480	4, 050	4, 370	Do.
2, 470	2, 510	2, 780	2, 940	Do.
3, 720	3, 800	4, 280	4, 580	Do.
3, 910	3, 960	4, 350	4, 480	Do.
5, 070	5, 160	5, 880	6, 300	Sheared fibers. Opened grain at end and along one face.
4, 760	4, 870	5, 500	6, 080	Sheared fibers.
3, 670	3, 720	4, 260	4, 620	Do.
.....	.....	.....	.....	Split at end. Indented section covers ⅞-inch knot.
4, 900	5, 010	5, 680	6, 080	Sheared fibers.
8, 240	8, 450	9, 700	10, 700	Slight shearing of fibers.
7, 090	7, 200	8, 500	9, 400	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pound*
397*e*		4, 200	6, 150	6, 680	7, 090	7, 470	**7, 700**	8, 1
882*a*		2, 950	4, 680	5, 170	5, 470	5, 610	**5, 850**	5, 9
915*a*		2, 100	4, 780	5, 720	6, 050	6, 360	**6, 660**	6, 8
631*a*		1, 920	4, 440	5, 420	5, 860	5, 980	**6, 070**	6, 3
631*b*		2, 670	3, 890	4, 100	4, 240	4, 380	**4, 460**	4, 5
821*e*		3, 180	4, 710	5, 040	5, 270	5, 460	**5, 680**	5, 8
821*e*		2, 460	3, 320	3, 460	3, 570	3, 690	**3, 760**	3, 8
914*a*		3, 080	4, 410	4, 640	4, 870	5, 000	**5, 200**	5, 3
315*a*		1, 480	2, 280	2, 550	2, 690	2, 840	**2, 950**	3, 0
315*b*		1, 900	2, 580	2, 810	2, 920	3, 010	**3, 140**	3, 2
785*c*		1, 640	2, 570	2, 960	3, 160	3, 260	**3, 300**	3, 4
785*c*		1, 980	3, 100	3, 490	3, 630	3, 760	**3, 800**	3, 8
1074*a*		1, 310	2, 050	2, 260	2, 380	2, 500	**2, 570**	2, 6
1075*a*		1, 550	2, 180	2, 280	2, 450	2, 550	**2, 650**	2, 7
1076*a*		2, 100	2, 740	3, 040	3, 130	3, 220	**3, 350**	3, 4
1076*b*		1, 900	2, 260	2, 450	2, 580	2, 720	**2, 840**	2, 9
996		2, 800	4, 410	4, 800	4, 980	5, 130	**5, 260**	5, 3
996		2, 950	5, 480	4, 750	4, 900	5, 050	**5, 180**	5, 2

TABLE 3.—INDENTATION TESTS—Continued.

Loads for indentations of—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
8,800	9,140	11,050	.....	Sheared fibers. Split at end.
6,220	6,380	.....	.....	Do.
7,300	7,400	8,580	9,200	Sheared fibers.
6,510	6,580	7,360	7,800	Do.
4,710	4,780	5,480	5,900	Do.
6,110	6,170	7,300	7,750	Do.
4,040	4,060	4,780	5,250	Do.
5,780	5,910	6,500	7,650	Do.
3,180	3,240	3,700	.....	Slight shearing of fibers. Split at end.
3,470	3,570	4,100	.....	Do.
3,580	3,670	4,190	4,460	Sheared fibers.
3,970	4,050	4,480	4,780	Do.
2,800	2,890	3,300	.....	Sheared fibers. Split at end.
2,850	2,930	3,350	3,600	Sheared fibers.
3,600	3,680	4,240	4,600	Do.
3,120	3,200	3,760	.....	Sheared fibers. Split at end.
5,510	5,630	6,500	6,980	Sheared fibers.
5,670	5,720	6,650	7,190	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Poun*
996		3, 200	4, 700	5, 050	5, 200	5, 330	5, 480	5,
1154*a*		2, 250	4, 380	3, 770	3, 960	4, 110	4, 290	4,
1154*c*		2, 280	3, 680	4, 050	4, 170	4, 280	4, 390	4,
1155*c*		2, 400	3, 010	3, 150	3, 280	3, 360	3, 440	3,
1155*e*		2, 240	3, 470	3, 720	3, 800	3, 910	3, 980	4,
1156*c*		2, 050	3, 080	3, 360	3, 480	3, 520	3, 580	3,
1156*e*		2, 000	3, 000	3, 060	3, 100	3, 150	3, 210	3,
619*a*		1, 500	2, 140	2, 410	2, 560	2, 660	2, 770	2,
626*a*		2, 550	3, 800	4, 080	4, 140	4, 200	4, 360	4,
630*a*		3, 200	5, 290	5, 440	5, 550	5, 750	5, 880	6,
630*b*		2, 200	3, 420	3, 890	4, 040	4, 080	4, 150	4,
632*a*		2, 500	2, 960	3, 210	3, 380	3, 530	3, 680	3,
636*a*		2, 250	2, 600	2, 620	2, 810	2, 920	2, 960	3,
689*a*		2, 200	3, 150	3, 400	3, 580	3, 720	3, 880	3,
718*a*		2, 250	2, 570	2, 670	2, 780	2, 860	2, 890	2,
718*b*		1, 890	2, 700	2, 870	2, 920	3, 010	3, 090	3,
731*b*		2, 650	3, 900	4, 200	4, 370	4, 460	4, 560	4,
907*a*		1, 950	3, 390	3, 900	4, 010	4, 100	4, 250	4,

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
5,550	5,590	.....	.....	Sheared fibers. Split at end.
4,670	4,720	5,350	.....	Do.
5,630	5,680	6,250	6,450	Sheared fibers.
3,730	3,790	4,400	4,860	Do.
4,180	4,200	.....	.....	Sheared fibers. Split at end.
3,640	3,650	3,920	4,170	Sheared fibers.
3,390	3,450	3,980	4,230	Do.
3,000	3,090	3,560	.....	Sheared fibers. Split at end.
4,670	4,750	5,150	5,600	Sheared fibers.
6,290	6,400	7,200	7,580	Do.
4,340	4,370	4,880	5,250	Do.
4,080	4,190	4,800	.....	Slight shearing of fibers. Split at end
3,270	3,370	3,880	3,960	Sheared fibers.
4,180	4,260	4,850	.....	Do.
3,080	3,170	3,700	4,140	Do.
3,400	3,480	3,900	4,250	Do.
4,820	4,890	5,600	5,920	Do.
4,680	4,810	5,500	5,940	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds*
910*a*		1, 510	3, 290	3, 810	4, 040	4, 190	4, 380	4, 47
633*a*		2, 780	4, 140	4, 460	4, 790	4, 980	5, 090	5, 17
633*b*		3, 480	3, 900	4, 150	4, 290	4, 340	4, 440	4, 55
667*e*		1, 900	2, 900	3, 040	3, 260	3, 410	3, 540	3, 64
667*e*		1, 700	2, 850	3, 270	3, 460	3, 580	3, 670	3, 78
664*e*		550	2, 100	3, 900	4, 270	4, 410	4, 640	4, 78
664*e*		2, 250	4, 800	5, 900	6, 290	6, 480	6, 640	6, 77
997		3, 450	3, 940	4, 200	4, 410	4, 580	4, 770	4, 96
997		2, 650	4, 400	5, 160	5, 700	5, 920	6, 240	6, 38
293*e*		1, 950	2, 360	2, 650	2, 710	2, 760	2, 800	2, 82
293*e*		1, 470	2, 340	2, 520	2, 580	2, 640	2, 690	2, 74
563*a*		2, 800	3, 030	3, 310	3, 500	3, 670	3, 780	3, 91
625*a*		1, 980	2, 790	3, 170	3, 290	3, 370	3, 450	3, 48
625*b*		1, 780	2, 320	2, 540	2, 630	2, 760	2, 870	2, 93
644*a*		2, 650	3, 920	4, 210	4, 370	4, 500	4, 600	4, 78
644*b*		3, 240	4, 440	4, 880	5, 140	5, 210	5, 320	5, 51
1157		2, 400	2, 700	2, 980	3, 080	3, 240	3, 380	3, 47
1157		1, 660	2, 750	3, 030	3, 140	3, 260	3, 410	3, 47

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
4, 720	4, 810	5, 710	6, 280	Sheared fibers.
5, 330	5, 360	5, 950	.....	Sheared fibers. Split at end.
4, 670	4, 740	.....	.....	Do.
3, 860	3, 910	4, 550	4, 900	Do.
3, 960	4, 060	4, 600	5, 020	Sheared fibers.
5, 040	5, 190	6, 200	.....	Sheared fibers. Split at ends.
7, 000	7, 260	8, 300	.....	Slight shearing of fibers. Split at end.
5, 230	5, 380	.....	.....	Do.
6, 780	6, 960	.....	.....	Sheared fibers. Split at end.
2, 850	2, 890	3, 300	3, 680	Sheared fibers.
2, 810	2, 840	3, 300	3, 480	Do.
4, 210	4, 330	4, 900	5, 300	Do.
3, 630	3, 670	4, 000	.....	Sheared fibers. Split at end.
3, 100	3, 160	3, 550	3, 940	Sheared fibers.
4, 980	5, 100	5, 880	6, 260	Do.
5, 730	5, 850	6, 850	.....	Slight shearing of fibers. Split at end.
3, 640	3, 720	4, 460	4, 880	Sheared fibers.
3, 680	3, 780	4, 350	4, 820	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
676*b*		1,800	3,100	3,460	3,580	3,670	3,750	3,7
676*b*		2,100	3,210	3,570	3,690	3,770	3,850	3,9
576*a*		1,320	2,410	2,880	3,040	3,140	3,210	3,2
576*b*		1,690	2,570	2,780	2,860	2,910	2,970	3,0
82*e*		.....	2,600	2,970	3,070	3,210	3,350	3,4
82*e*		2,660	4,370	4,890	5,280	5,370	5,550	5,6
355*e*		2,550	3,190	3,370	3,510	3,650	3,760	3,8
355*e*		2,740	3,890	4,230	4,520	4,670	4,900	4,9
388*e*		1,940	2,410	2,560	2,680	2,810	2,970	3,1
388*e*		1,900	2,470	2,630	2,810	2,920	3,100	3,2
389*a*		2,750	3,160	3,300	3,440	3,600	3,690	3,7
389*a*		2,040	3,350	3,700	3,970	4,090	4,190	4,2
13*b*		4,030	4,900	5,060	5,160	5,400	5,580	5,7
13*b*		3,400	5,550	6,270	6,810	7,070	7,280	7,4
1046*e*		2,070	2,800	2,960	3,030	3,070	3,090	3,
1046*e*		1,550	2,600	3,020	3,140	3,180	3,270	3,
83*e*		5,850	7,670	8,270	8,600	8,860	9,150	9,
83*e*		5,860	9,380	10,780	11,550	12,040	12,530	12,

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
3, 850	3, 880	4, 840	4, 560	Sheared fibers.
4, 040	4, 120	4, 170	.....	Sheared fibers. Split at end.
3, 390	3, 460	3, 900	4, 200	Sheared fibers.
3, 150	3, 240	.....	3, 850	Do.
3, 650	3, 680	.....	.....	Split at ends. Fibers did not shear.
5, 890	5, 980	6, 600	.....	Sheared fibers. Split at ends.
4, 010	4, 090	.....	.....	Split at end. Fibers did not shear.
5, 220	5, 330	6, 080	6, 510	Indented without shearing fibers.
3, 410	3, 520	4, 200	.....	Sheared fibers. Split at ends.
3, 520	3, 610	4, 400	.....	Split at end. Fibers did not shear.
3, 910	3, 960	4, 450	4, 810	Sheared fibers.
4, 420	4, 490	4, 990	5, 150	Do.
6, 040	6, 270	7, 250	7, 760	Do.
7, 890	8, 140	9, 300	9, 900	Do.
3, 290	3, 350	3, 700	3, 960	Do.
3, 430	3, 450	3, 940	4, 150	Do.
9, 720	9, 970	11, 500	12, 900	Do.
12, 200	12, 340	12, 700	.....	Sheared fibers. Split along grain.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds*
622*a*		2,300	3,700	4,460	4,690	4,820	4,940	5,020
621*a*		3,350	4,700	5,110	5,280	5,460	5,640	5,750
1169*e*		2,670	3,960	4,480	4,620	4,770	4,840	4,930
1169*e*		2,460	4,570	5,180	5,360	5,520	5,570	5,730
1172*e*		2,750	5,300	6,200	6,780	7,160	7,370	7,520
1172*e*		3,050	4,590	4,970	5,080	5,290	5,380	5,540
279*b*		2,740	4,280	4,630	4,890	5,070	5,240	5,370
279*b*		2,500	3,150	3,650	3,780	3,970	4,000	4,070
321*e*		2,760	3,720	4,040	4,210	4,300	4,480	4,670
321*e*		2,100	3,200	3,560	3,700	3,820	3,870	3,940
671*b*		3,150	4,190	4,520	4,710	4,920	5,040	5,170
671*e*		1,900	2,920	3,340	3,530	3,680	3,870	3,940
278*a*		2,380	3,150	3,420	3,580	3,760	3,870	3,990
278*a*		3,070	4,800	5,470	5,760	5,900	6,090	6,130
319*a*		2,550	3,390	3,580	3,800	3,990	4,110	4,250
142*a*		2,300	3,900	4,280	4,470	4,620	4,760	4,870
142*b*		2,270	3,240	3,320	3,450	3,540	3,570	3,630
544*e*		1,900	2,640	2,890	2,940	3,120	3,180	3,260

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
5, 160	5, 220	5, 760	.....	Sheared fibers. Split at end.
5, 960	6, 060	6, 680	7, 060	Sheared fibers.
5, 000	5, 040	5, 670	5, 810	Do.
5, 930	6, 020	.....	.....	Slight shearing of fibers. Split at end.
.....	.....	.....	.....	Split at end.
5, 740	5, 820	6, 600	7, 050	Sheared fibers.
5, 590	5, 680	6, 350	.....	Sheared fibers. Split at end.
4, 120	4, 240	4, 700	5, 200	Sheared fibers.
4, 960	5, 140	6, 100	.....	Sheared fibers. Split along grain.
4, 020	4, 210	5, 050	5, 500	Sheared fibers.
5, 360	5, 490	6, 100	.....	Sheared fibers. Split at end.
4, 190	4, 290	5, 080	.....	Do.
4, 300	4, 430	5, 160	.....	Slight shearing of fibers. Split at end.
6, 140	6, 150	6, 920	.....	Sheared fibers. Split at end.
4, 490	4, 620	.....	.....	Slight shearing of fibers. Split at end.
5, 060	5, 170	5, 950	6, 430	Sheared fibers.
3, 720	3, 750	4, 100	4, 300	Do.
3, 380	3, 450	3, 850	4, 140	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
544*c*		1,520	2,530	2,830	2,950	3,070	3,150	3,1
764*e*		2,310	3,340	3,510	3,660	3,810	3,880	3,9
764*e*		3,020	3,690	3,940	4,110	4,250	4,370	4,4
394*a*		1,560	2,750	3,070	3,240	3,370	3,460	3,5
394		1,200	3,200	3,600	3,920	4,080	4,360	4,4
780*b*		2,500	3,180	3,310	3,490	3,610	3,770	3,9
780*b*		1,780	2,900	3,350	3,590	3,720	3,790	3,8
879*b*		1,890	2,880	3,100	3,120	3,140	3,170	3,2
879*b*		2,360	2,850	3,000	3,180	3,370	3,470	3,6
81*c*		3,900	5,000	5,510	5,780	5,910	6,170	6,3
81*d*		3,060	4,100	4,400	4,600	4,780	4,980	5,1
85*e*		2,200	3,560	3,920	4,100	4,230	4,380	4,5
85		3,180	3,580	3,810	3,920	4,130	4,280	4,3
243*e*		3,500	4,320	4,550	4,650	4,830	5,010	5,1
243*e*		4,800	6,180	6,640	6,800	6,200	6,350	6,1
302*e*		3,260	4,150	4,150	4,200	4,460	4,980	5,(
302*e*		2,480	3,200	3,340	3,610	3,770	3,950	4,1
357*e*		2,500	3,180	3,460	3,850	3,960	4,170	4,3

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
3, 270	3, 340	3, 600	4, 030	Sheared fibers.
4, 190	4, 280	4, 820	5, 150	Do.
4, 560	4, 620	5, 300	6, 140	Do.
3, 710	3, 780	4, 400	4, 720	Do.
4, 610	4, 730	5, 410	5, 850	Do.
4, 150	4, 240	5, 150	5, 700	Sheared fibers. ½-inch knot in indented section.
4, 060	4, 090	4, 480	.....	Sheared fibers. Split at end.
3, 590	3, 680	3, 900	4, 300	Sheared fibers.
3, 890	3, 950	4, 550	.....	Sheared fibers. Split at end.
6, 660	6, 750	7, 100	7, 200	Sheared fibers.
5, 380	5, 480	.....	.....	Slight shearing of fibers. Split at end.
4, 930	5, 040	5, 950	.....	Sheared fibers. Split at end.
.....	.....	.....	.....	Split at end. Fibers did not shear.
5, 310	5, 380	.....	.....	Slight shearing of fibers. Split at end.
7, 180	7, 280	8, 700	.....	Sheared fibers. Split at end.
5, 960	6, 400	.....	.....	Sheared fibers. Opened season cracks.
5, 480	5, 690	6, 550	.....	Slight shearing of fibers. Split at end.
4, 660	4, 780	.....	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".0
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pou*
357*e*		3, 880	5, 280	5, 640	5, 780	5, 810	5, 840	5,
358*e*		3, 100	3, 710	4, 040	4, 280	4, 490	4, 690	4,
358*e*		4, 100	6, 100	6, 550	6, 700	6, 920	7, 250	7,
359*a*		4, 300	5, 060	5, 500	5, 820	6, 190	6, 370	6,
359*a*		4, 900	7, 060	7, 600	7, 680	7, 720	7, 810	8,
360*e*		3, 420	4, 050	4, 490	4, 880	5, 340	5, 600	5,
360*e*		4, 500	6, 440	6, 550	6, 200	5, 950	6, 210	6,
361*a*		4, 150	6, 720	7, 580	8, 070	8, 270	8, 570	8,
361*a*		3, 550	4, 320	4, 400	4, 710	4, 960	5, 160	5,
384*e*		3, 100	3, 400	3, 760	3, 920	4, 220	4, 410	4,
384*e*		3, 200	5, 600	6, 360	6, 670	6, 870	6, 980	7,
385*e*		2, 800	4, 200	4, 580	4, 890	5, 060	5, 200	5,
385*e*		2, 890	3, 990	4, 460	4, 750	4, 960	5, 070	5
390*f*		2, 900	3, 240	3, 610	4, 000	4, 160	4, 350	4
390*f*		3, 400	4, 280	4, 880	4, 720	5, 100	5, 360	5
84*e*		2, 450	3, 100	3, 340	3, 440	3, 510	3, 720	3
84*e*		2, 850	3, 900	4, 070	4, 170	4, 260	4, 370	4
356*e*		2, 710	3, 200	3 500	3, 760	3, 960	4, 300	4

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
6,670	6,910	.....	.....	Sheared fibers. Split at end.
5,060	5,180	.....	.....	Split at end. Fibers did not shear.
7,780	8,010	9,150	.....	Slight shearing of fibers. Split at end.
7,210	.....	.....	.....	Split at end. Fibers did not shear.
8,470	8,590	.....	.....	Slight shearing of fibers. Split at end.
6,360	6,610	.....	.....	Do.
7,310	7,610	.....	.....	Sheared fibers. Split at end.
8,350	9,040	10,600	11,500	Sheared fibers.
5,690	5,850	6,680	.....	Slight shearing of fibers. Split at end.
4,800	4,990	6,040	.....	Do.
7,400	7,520	.....	.....	Sheared fibers. Split at end.
5,670	5,810	6,850	.....	Slight shearing of fibers. Split at ends.
5,500	5,720	6,200	.....	Do.
5,020	5,180	.....	.....	Do.
140	6,490	.....	.....	Sheared fibers. Split at ends.
3,960	4,020	.....	.....	Slight shearing of fibers. Split at ends.
5,020	5,140	6,140	.....	Do.
4,930	5,080	.....	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pound*
356e		5,100	7,480	8,340	8,780	8,980	9,340	9,3
498e		6,350	8,580	9,700	10,550	11,200	11,580	12,3
498e		4,050	6,000	6,900	7,270	7,580	7,840	8,1
231e		1,820	2,780	3,100	3,180	3,290	3,350	3,4
231e		2,040	2,700	3,280	3,400	3,500	3,610	3,7
373a		1,300	1,780	2,080	2,180	2,050	2,470	2,5
776b		1,420	2,400	2,700	2,780	2,820	2,870	2,9
776b		1,650	2,400	2,780	2,870	2,980	3,040	3,0
794b		1,600	2,120	2,27	2,360	2,430	2,480	2,5
794b		1,480	2,220	2,340	2,360	2,420	2,490	2,6
880a		1,400	2,120	2,290	2,380	2,460	2,520	2,5
880a		1,400	2,070	2,280	2,410	2,480	2,560	2,6
513e		1,710	2,340	2,540	2,600	2,650	2,700	2,7
513e		1,620	2,470	2,770	2,920	3,060	3,130	3,1
620e		1,600	2,510	2,890	3,080	3,190	3,280	3,3
620e		1,490	2,390	2,720	2,960	3,070	3,170	3,2
773e		1,240	1,760	1,940	2,000	2,110	2,230	2,3
773e		1,390	2,070	2,340	2,410	2,480	2,520	2,5

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
9, 740	9, 980	.....	.....	Sheared fibers. Split at ends.
12, 900	13, 700	.....	.....	Sheared fibers. Split at end. Indented section covers ½" knot.
8, 570	8, 660	9, 140	9, 360	Sheared fibers.
3, 590	3, 660	4, 080	.....	Sheared fibers. Split at ends.
3, 920	3, 990	.....	.....	Slight shearing of fibers. Split at ends.
2, 720	2, 770	3, 200	3, 570	Do.
3, 020	3, 080	3, 440	3, 800	Sheared fibers.
3, 240	3, 330	3, 840	.....	Sheared fibers. Split at end.
2, 700	2, 750	3, 150	3, 320	Sheared fibers.
2, 690	2, 740	3, 060	3, 320	Do.
2, 700	2, 760	3, 020	3, 280	Do.
2, 730	2, 810	3, 280	3, 480	Do.
2, 900	2, 940	3, 500	.....	Do.
3, 320	3, 400	3, 700	4, 020	Slight shearing of fibers.
3, 450	3, 480	3, 800	.....	Sheared fibers. Split at end. Indented section covers ½" knot.
3, 470	3, 610	4, 270	4, 700	Sheared fibers.
2, 460	2, 540	2, 920	.....	Slight shearing of fibers. Split at end.
2, 790	2, 870	3, 170	3, 460	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds*
784*c*		1,460	1,800	1,970	2,180	2,220	2,270	2,38
784*e*		1,420	2,020	2,110	2,130	2,190	2,290	2,34
791*c*		1,800	2,130	2,250	2,360	2,480	2,580	2,69
791*e*		1,410	2,170	2,300	2,360	2,510	2,610	2,71
292*c*		1,250	2,380	2,580	2,720	2,810	2,920	3,00
292*e*		2,100	3,040	3,340	3,520	3,670	3,770	3,86
575*a*		1,260	1,840	1,860	1,890	1,900	1,910	1,98
822*e*		1,800	1,990	2,170	2,260	2,350	2,420	2,47
269$_1$*a*		2,600	2,820	3,090	3,220	3,360	3,450	3,57
270$_1$*a*		1,410	2,010	2,090	2,120	2,170	2,240	2,28
270$_2$*a*		2,240	2,580	2,720	2,770	2,850	2,940	3,04
970*c*		1,960	2,610	2,870	3,120	3,260	3,370	3,54
970*e*		1,580	2,920	3,470	3,590	3,760	3,890	4,03
977*c*		1,380	1,650	1,780	1,920	2,080	2,130	2,19
977*e*		1,670	2,520	2,770	2,910	2,970	3,060	3,10
1015		1,010	1,380	1,520	1,650	1,740	1,830	1,91
1019*b*		1,590	1,750	1,870	1,980	2,110	2,250	2,31
1019*b*		1,600	2,000	2,040	2,060	2,140	2,240	2,31

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10"	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
2, 450	2, 500	3, 040	.....	Sheared fibers. Split at end.
2, 420	2, 490	2, 780	3, 040	Sheared fibers.
2, 910	2, 970	3, 600	.....	Sheared fibers. Split at end.
2, 870	2, 920	3, 290	3, 610	Sheared fibers.
3, 120	3, 190	3, 480	3, 820	Do.
3, 920	4, 000	.....	.....	Sheared fibers. Indented section covers §." knot.
2, 090	2, 100	2, 300	2, 510	Sheared fibers.
2, 590	2, 660	2, 910	.....	Sheared fibers. Split at end.
3, 680	3, 710	4, 150	4, 430	Sheared fibers.
2, 350	2, 420	2, 810	3, 020	Do.
3, 180	3, 240	3, 610	3, 920	Do.
3, 810	3, 860	4, 600	.....	Sheared fibers. Split at end.
4, 340	4, 560	5, 280	5, 580	Sheared fibers.
2, 560	2, 760	.....	.....	Slight shearing of fibers. Split at end.
3, 160	3, 210	3, 780	.....	Sheared fibers. Split at end.
2, 070	2, 130	.....	.....	Split at end. Fibers did not shear.
2, 510	2, 560	3, 160	.....	Slight shearing of fibers. Split at end.
2, 460	2, 560	2, 990	.....	Sheared fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds*
1026*a*		1,910	2,300	2,470	2,580	2,640	2,690	2,82
1026*b*		1,890	2,000	2,160	2,280	2,320	2,360	2,45
5*a*		1,920	2,220	2,390	2,640	2,810	2,860	2,88
5*a*		1,700	1,800	1,870	1,970	2,080	2,210	2,44
219*e*		1,280	1,700	1,910	2,100	2,190	2,240	2,32
219*e*		1,470	1,880	1,970	2,150	2,210	2,350	2,44
775*a*		2,510	2,960	3,250	3,390	3,590	3,800	3,92
775*b*		2,190	2,640	2,840	2,980	3,180	3,410	3,56
778*e*		1,610	2,080	2,250	2,370	2,440	2,550	2,65
778*e*		1,750	2,390	3,120	3,190	3,260	3,390	3,56
787*e*		2,040	3,250	3,220	3,220	3,230	3,490	3,61
787*f*		1,100	1,890	2,170	2,200	2,310	2,400	2,52
798*e*		2,950	4,040	4,500	4,890	4,940	4,950	4,96
798*e*		2,450	3,200	3,420	3,680	3,820	3,950	4,04
772*e*		1,950	2,200	2,470	2,910	3,080	3,120	3,17
772*e*		1,690	2,570	2,770	2,900	3,160	3,290	3,42
817*e*		1,200	1,560	1,720	1,770	1,860	1,890	1,92
817*e*		1,150	1,550	1,730	1,820	1,880	1,920	1,96

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	Pounds.	Pounds.	Pounds.	
2, 900	3, 120	3, 600	.....	Sheared fibers. Split at end.
2, 540	2, 870	2, 870	3, 080	Sheared fibers.
.....	.....	.....	.....	Slight shearing of fibers. Split at end.
2, 680	2, 770	3, 400	3, 820	Sheared fibers.
2, 470	2, 560	2, 800	.....	Slight shearing of fibers. Split at end.
2, 600	2, 690	3, 150	.....	Do.
4, 210	4, 340	5, 300	6, 000	Do.
3, 330	4, 620	5, 100	.....	Do.
2, 720	2, 760	3, 000	3, 300	Sheared fibers. Split at end.
4, 050	4, 400	.....	.....	Sheared fibers
3, 360	3, 360	4, 400	4, 720	Do.
.....	.....	.....	.....	Split at end.
4, 970	4, 940	5, 030	.....	Slight shearing of fibers. Split at end.
.....	.....	.....	.....	Do.
3, 230	3, 500	3, 880	.....	Sheared fibers. Split at ends.
2, 770	3, 920	4, 580	.....	Sheared fibers. Split from end to end.
2, 030	2, 070	2, 280	.....	Do.
2, 180	2, 210	2, 470	2, 610	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—							
		".01.	".02.	".03.	".04.	".05.	".06.	".07.	
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
1040*e*		1,260	2,280	2,490	2,630	2,750	2,840	2,920	
1040*e*		2,950	4,100	4,050	4,270	4,560	4,720	4,980	
1042*e*		1,050	1,890	2,410	2,700	2,880	2,980	3,080	
1042*e*		1,450	1,700	1,800	1,920	1,970	2,070	2,180	
628*a*		2,610	3,620	4,060	4,250	4,400	4,480	4,580	
971*a*		1,240	1,870	2,140	2,310	2,410	2,510	2,580	
995*a*		2,010	2,600	2,900	3,080	3,220	3,330	3,520	
995*a*		3,100	4,480	4,700	4,900	5,100	5,280	5,500	
980*e*		1,900	2,900	3,170	3,310	3,420	3,510	3,630	
980*e*		2,400	3,170	3,380	3,670	3,920	4,030	4,210	
271*sa*		3,100	4,300	4,670	5,020	5,170	5,370	5,440	
627*a*		1,910	2,580	2,820	2,890	2,920	3,000	3,100	
627*b*		1,630	2,400	2,570	2,690	2,830	2,910	2,990	
702*a*		2,880	4,720	5,380	5,680	5,880	6,080	6,170	
704*a*		2,950	4,620	4,870	5,120	5,270	5,450	5,610	
705*a*		2,560	3,380	3,650	3,770	3,840	3,920	4,040	
706*a*		1,910	2,470	2,620	2,770	2,850	2,980	3,080	
708*a*		3,900	5,050	5,560	5,900	6,210	6,550	6,830	

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09."	".10."	".15."	".20."	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
3, 090	3, 210	3, 770	.....	Slight shearing of fibers. Split at end.
5, 180	5, 250	5, 900	.....	Sheared fibers. Split at ends.
3, 120	3, 180	3, 350	3, 720	Sheared fibers.
2, 280	2, 360	.....	.....	Slight shearing of fibers. Split at end.
4, 680	4, 720	5, 150	5, 500	Slight shearing of fibers. Split at ends.
2, 780	2, 870	3, 370	.....	Do.
3, 820	3, 900	4, 900	.....	Slight shearing of fibers. Split at end.
5, 820	5, 910	6, 780	.....	Sheared fibers. Split at end.
3, 830	3, 900	4, 450	4, 920	Sheared fibers.
4, 400	4, 500	5, 250	5, 720	Do.
5, 680	5, 730	6, 390	.....	Sheared fibers. Split at end.
3, 260	3, 310	3, 780	.....	Slight shearing of fibers. Split at end.
3, 160	3, 220	3, 670	.....	Do.
6, 460	.....	.....	.....	Slight shearing of fibers. Split at end. ⅜" knot in indented section.
5, 330	6, 020	.....	.....	Slight shearing of fibers. Split at end.
4, 260	4, 330	4, 900	5, 200	Sheared fibers. Split at end.
3, 230	3, 310	3, 840	.....	Do.
7, 520	7, 840	9, 050	.....	Do.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
708*b*		2,500	4,580	5,090	5,310	5,510	5,720	5,890
709*a*		2,380	2,660	2,750	2,860	2,980	3,020	3,050
709*c*		2,710	2,600	2,400	2,850	3,150	3,370	3,620
720*a*		2,280	2,640	2,730	2,880	3,020	3,110	3,190
720*b*		2,140	3,170	3,340	3,320	3,340	3,410	3,500
732*a*		1,900	2,440	2,690	2,790	2,910	3,000	3,160
732*b*		3,380	4,850	5,060	5,100	4,950	4,650	4,700
881*c*		4,040	5,280	5,470	5,610	5,720	5,810	5,980
881*e*		2,900	4,260	4,670	4,970	5,070	5,170	5,310
973*a*		1,900	2,110	2,190	2,020	2,230	2,240	2,300
973*b*		2,420	4,000	4,370	4,280	4,100	3,920	3,460
974*a*		1,960	2,690	2,700	2,650	2,710	2,950	3,110
974*b*		1,690	2,400	2,540	2,650	2,760	2,870	2,960
989*a*		2,100	2,910	3,240	3,410	3,500	3,630	3,690
1008*a*		1,850	2,400	2,660	2,870	2,970	3,060	3,200
1008*b*		2,900	4,600	4,970	4,940	4,400	4,360	4,320
1016*c*		1,950	2,440	2,550	2,650	2,770	2,870	2,960
1016*e*		1,800	2,200	2,310	2,370	2,480	2,610	2,720

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
″.09.	″.10.	″.15.	″.20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
6,220	6,430	.....	.....	Sheared fibers. Split at end.
3,270	3,330	3,800	4,040	Sheared fibers.
3,890	4,020	4,300	4,460	Do.
3,390	3,470	4,000	4,420	Do.
3,790	3,910	4,300	4,720	Do.
3,320	3,430	.....	.....	Slight shearing of fibers. Split at end.
5,200	5,370	.....	.....	Sheared fibers. Split at end.
6,220	6,420	7,200	7,850	Do.
.....	.....	.....	.....	Slight shearing of fibers. Split at end.
2,460	2,520	3,220	3,480	Sheared fibers.
3,610	3,820	5,500	6,000	Do.
3,360	3,470	4,020	.....	Sheared fibers. Split at end.
3,090	3,160	3,500	3,720	Slight shearing of fibers. Split at end
3,890	3,970	4,710	.....	Sheared fibers. Split at end.
3,330	3,460	.....	.....	Fibers did not shear. Split at end.
4,910	4,990	5,900	6,400	Sheared fibers.
3,150	3,170	3,620	.....	Fibers did not shear. Split at end.
2,960	3,060	.....	.....	Slight shearing of fibers. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1018*a*		2,300	2,670	2,860	2,960	3,070	3,210	3,390
1018*a*		1,960	2,490	2,620	2,710	2,830	2,930	3,050
1020*a*		1,610	1,720	1,780	1,850	2,080	2,210	2,290
1020*b*		1,480	1,900	2,100	2,050	2,210	2,450	2,550
1011*a*		1,700	2,880	3,160	3,260	3,350	3,430	3,500
1011*b*		2,040	2,570	2,680	2,810	2,940	3,060	3,150
1022*a*		1,800	1,870	1,950	2,000	2,120	2,190	2,270
1022*b*		2,600	3,200	3,300	3,100	2,850	2,910	3,240
986*a*		1,720	1,900	2,100	2,210	2,310	2,380	2,470
642*b*		2,380	3,420	3,600	3,550	3,560	3,730	3,920
642*b*		2,550	3,350	3,490	3,580	3,680	3,810	3,850
523*e*		1,190	1,880	2,170	2,340	2,410	2,480	2,550
523*e*		1,100	1,840	2,070	2,150	2,210	2,290	2,380
377*b*		1,420	1,910	2,190	2,440	2,650	2,770	2,880
449$_1$*a*		1,600	2,240	2,380	2,450	2,510	2,590	2,670
449$_1$*b*		1,750	2,040	2,050	2,080	2,160	2,220	2,290
449$_2$*a*		1,310	1,810	1,970	2,070	2,150	2,230	2,280
449$_2$*b*		1,720	1,940	2,190	2,310	2,410	2,480	2,610

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
3, 680	3, 830	4, 590	.....	Slight shearing of fibers. Split at end.
3, 270	3, 320	.....	.....	Do.
2, 430	2, 500	3, 000	.....	Do.
2, 670	2, 760	3, 150	3, 580	Sheared fibers.
3, 600	3, 660	4, 200	4, 450	Do.
3, 280	3, 360	3, 800	.....	Sheared fibers. Split at end.
2, 440	2, 520	2, 880	.....	Slight shearing of fibers. Split at end.
3, 860	3, 980	4, 380	5, 100	Sheared fibers.
2, 580	2, 630	2, 890	.....	Sheared fibers. Split at end.
4, 210	4, 320	4, 800	5, 310	Sheared fibers.
4, 020	4, 060	4, 590	4, 820	Do.
2, 630	2, 650	3, 040	3, 180	Do.
2, 490	2, 570	2, 880	3, 040	Do.
3, 080	3, 190	.....	.....	Slight shearing of fibers. Split at end. $\frac{1}{16}$" knot in indented section.
2, 780	2, 880	3, 250	3, 520	Sheared fibers.
2, 460	2, 460	2, 800	3, 030	Do.
2, 380	2, 430	2, 800	.....	Sheared fibers. Split at end.
2, 730	2, 790	3, 180	3, 500	Sheared fibers.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		".01.	".02.	".03.	".04.	".05.	".06.	".07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds*
820		1,200	1,800	1,910	1,960	1,970	.....	.....
820		1,240	1,820	2,110	2,180	2,220	2,270	2,29
1010*a*		1,390	1,800	1,850	1,850	1,890	2,010	2,12
1010*b*		1,100	1,360	1,470	1,570	1,680	1,770	1,86
529*b*		1,690	2,210	2,410	2,480	2,520	2,570	2,58
529*b*		1,150	1,710	1,970	2,140	2,210	2,260	2,32
639*a*		1,650	2,500	2,620	2,640	2,680	2,750	2,82
639*b*		1,880	2,460	2,660	2,860	2,910	2,970	3,09
733*a*		2,500	2,740	2,950	3,170	3,380	3,510	3,73
733*b*		2,500	2,600	2,710	2,800	2,810	2,920	3,24
1004*c*		1,500	1,900	2,050	2,210	2,340	2,420	2,49
1004		1,810	1,860	1,940	2,070	2,210	2,380	2,46
965*a*		2,990	3,450	3,750	4,060	4,280	4,640	4,89
965*a*		2,610	3,550	3,740	3,920	4,170	4,340	4,52
647*e*		1,860	2,240	2,410	2,530	2,590	2,660	2,76
647		2,250	3,490	3,880	4,100	4,220	4,370	4,54
226$_1$*e*		2,800	3,900	4,600	4,940	5,270	5,450	5,62
226$_1$*f*		2,700	3,380	3,590	3,920	4,120	4,290	4,38

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	Pounds.	Pounds.	Pounds.	
.....	.....	.....	.....	Split at end.
2, 320	2, 330	2, 580	2, 700	Sheared fibers. Split at ends.
2, 350	2, 420	2, 700	3, 040	Sheared fibers.
1, 910	1, 950	.....	.....	Slight shearing of fibers. Split at end.
2, 630	2, 650	2, 870	.....	Sheared fibers.
2, 420	2, 460	3, 700	.....	Do.
2, 950	3, 000	3, 550	3, 900	Do.
3, 230	3, 330	3, 850	4, 200	Do.
4, 020	4, 120	.....	.....	Fibers did not shear. Split at end.
3, 510	3, 580	4, 100	.....	Sheared fibers. Split at end.
2, 630	2, 720	3, 200	.....	Do.
2, 680	2, 770	3, 150	.....	Do.
5, 170	5, 320	6, 300	7, 100	Slight shearing of fibers. Split at end.
4, 790	4, 880	5, 700	.....	Sheared fibers. Split at end.
2, 890	2, 920	3, 250	3, 640	Sheared fibers.
4, 670	4, 720	5, 300	5, 700	Do.
5, 820	5, 900	6, 500	6, 900	Slight shearing of fibers. Split at end.
4, 660	4, 770	5, 400	.....	Slight shearing of fibers. Split at end. Specimen 4".70 long.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pound*
226a		2, 290	3, 380	3, 810	4, 100	4, 370	4, 570	4, 74
226a		3, 800	5, 200	5, 950	6, 340	6, 480	6, 670	6, 70
774e		1, 880	2, 520	2, 750	2, 960	3, 060	3, 150	3, 18
774e		1, 750	2, 500	2, 820	2, 980	3, 190	3, 240	3, 25
781e		2, 190	2, 480	2, 690	2, 890	3, 060	3, 220	3, 39
781e		2, 800	3, 890	4, 200	4, 500	4, 760	4, 970	5, 17
786e		1, 900	2, 060	2, 370	2, 480	2, 620	2, 710	2, 78
786e		1, 550	2, 650	2, 800	2, 920	2, 970	3, 160	3, 38
795e		1, 610	2, 450	2, 620	2, 840	2, 930	3, 060	3, 15
795e		2, 210	2, 900	3, 150	3, 320	3, 420	3, 650	3, 90
840e		2, 900	3, 820	4, 060	4, 380	4, 590	4, 780	4, 91
840e		2, 600	3, 900	4, 170	4, 290	4, 470	4, 780	4, 96
719a		2, 100	3, 470	3, 910	4, 100	4, 250	4, 410	4, 45
719b		2, 670	3, 200	3, 480	3, 740	3, 960	4, 100	4, 29
984e		2, 900	3, 200	3, 410	3, 570	3, 770	3, 950	4, 21
984e		3, 600	5. 150	5, 180	5, 170	5, 290	5, 610	5, 91
1006b		3, 650	5, 910	6, 910	7, 380	7, 440	7, 650	8, 05
1006b		3, 100	3, 680	4, 200	4, 510	4, 760	5, 070	5, 27

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
5, 250	.....	.....	.....	Fibers did not shear. Split at end. Specimen 4".70 long.
6, 730	4, 640	.....	.....	Slight shearing of fibers. Shattered stick. Specimen 4".70 long.
3, 300	3, 390	3, 850	.....	Slight shearing of fibers. Split at end.
3, 320	3, 390	3, 900	.....	Do.
3, 690	3, 910	5, 100	5, 700	Slight shearing of fibers.
5, 520	5, 670	7, 050	.....	Slight shearing of fibers. Split at end.
2, 920	.....	.....	.....	Do.
3, 730	3, 920	4, 600	5, 100	Do.
3, 220	3, 310	.....	.....	Do.
4, 200	4, 280	.....	.....	Do.
5, 340	5, 450	6, 800	.....	Sheared fibers. Split at end. Indented section covers ¼" knot.
5, 490	5, 590	6, 680	.....	Slight shearing of fibers. Split at end.
4, 670	4, 820	5, 600	5, 980	Sheared fibers.
4, 590	4, 670	5, 400	.....	Slight shearing of fibers. Split at end.
4, 510	4, 680	5, 650	.....	Do.
6, 500	6, 820	.....	.....	Do.
8 600	8, 990	.....	.....	Do.
5 620	5, 890	.....	.....	Fibers did not shear. Split at end.

TABLE 3.—INDENTATION TESTS—Continued.

Mark on specimen.	Direction of loading.	LOADS FOR INDENTATIONS OF—						
		″.01.	″.02.	″.03.	″.04.	″.05.	″.06.	″.07.
	→	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1159		700	1,120	1,270	1,360	1,450	1,500	1,56
1159		1,790	2,660	2,920	3,080	3,180	3,300	3,42

TABLE 3.—INDENTATION TESTS—Continued.

LOADS FOR INDENTATIONS OF—				Effect on specimen.
".09.	".10.	".15.	".20.	
Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	
1,670	1,710	2,080	2,310	Sheared fibers.
3,590	3,650	4,260	4,400	Slight shearing of fibers.

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS.

In this table are recorded the results of the several tests in pounds per square inch, showing the relative strength of the same wood tested in different directions.

The modulus of elasticity (E) for the transverse specimens was computed from the formula $E=\frac{P l^3}{4 \triangle b d^3}$.

Where:

l = length between end supports in inches.
$\triangle$ = middle deflection in inches.
b = breadth in inches.
d = depth in inches.
P = load in pounds applied at the middle.

The deflections between loads of 110 and 120 pounds were used in the computation of E, for sticks which sustained a load of 441 pounds or more.

For sticks which failed with loads below 441 pounds E was computed between zero and 110 pounds.

Preference was given the deflections between the first and second increments of load for the stronger specimens, on account of some sticks being warped, which prevented their taking at first an even bearing, thereby sensibly affecting the first deflections.

For the weaker sticks the first deflections were used as more satisfactorily representing the wood.

One-twentieth of an inch indentation is adopted as the depth at which to compare the resistance of the different woods.

The identification of the specimens by means of letters affixed to their distinguishing numbers is observed in this tabulation in the same manner as described for the detailed results. Namely: All specimens marked with the letters *a*, *b*, *c*, or *d* had been tested transversely before they were tested by compression or indentation; and the letters *e* and *f* indicate that the compression and indentation specimens were taken from the same standard stick.

A distinguishing number without a letter affixed signifies the results opposite were obtained with specimens from a particular tree, but not otherwise identified.

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS.

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. p sq. in
346*a*	Magnolia grandiflora	Big Laurel; Bull Bay	11,760	1,237,000	
346*b*	do	do	10,950	1,158,000	
346*c*	do	do			7,16
346	do	do			6,54
354*a*	Magnolia glauca	Sweet Bay; White Bay	10,800	1,266,000	
354*b*	do	do	10,290	1,178,000	
354	do	do			6,41
354	do	do			5,66
246*a*	Magnolia acuminata	Cucumber Tree	10,080	1,835,000	
246*b*	do	do	9,580	1,289,000	5,88
246*c*	do	do			6,04
261	do	do	8,230	976,600	
261_1	do	do	7,440	1,020,000	
261_2	do	do			4,56
261_3c	do	do			4,93
534*a*	do	do	10,290	1,478,000	
534*b*	do	do	12,050	1,510,000	7,41
534*b*	do	do			
534	do	do			6,57
1178*a*	Magnolia cordata	do	8,080	1,199,000	
1178*b*	do	do	9,150	1,510,000	
1178*c*	do	do			5,80
1178	do	do			5,85
532*a*	Magnolia macrophylla	Large-Leaved Magnolia Tree	7,320	1,416,000	
532*b*	do	do	12,580	1,787,000	
532*c*	do	do			
532*c*	do	do			
532	do	do			6,54
532	do	do			7,35
266_1	Magnolia umbrella	Umbrella Tree	7,980	1,178,000	5,02
266_2	do	do	8,780	962,800	5,40
260_1	Magnolia Fraseri	Long-Leaved Cucumber Tree	11,590	1,446,000	6,73
260_2	do	do	8,640	1,340,000	
260*c*	do	do			5,16
138	Liriodendron tulipifera	Tulip Tree; White Wood; Yellow Poplar.			4,22
395	do	do	6,710	868,000	4,15
1231*a*	do	White Poplar	10,643	1,388,000	5,73
1231*b*	do	do	11,756	1,580,000	
1231*b*	do	do			
1231*c*	do	do	10,810	1,333,000	4,48
1232*a*	do	Yellow Poplar	6,560	1,158,000	5,22
1232*b*	do	do	10,370	1,544,000	
1232*b*	do	do			
1232*c*	do	do	9,450	1,340,000	5,60
1236*a*	do	Yellow Poplar; White Wood	9,940	1,215,000	
1236*b*	do	do	9,240	1,283,000	
1236*c*	do	do	8,360	1,158,000	
1236*c*	do	do			4,88
1236*c*	do	do			4,98
1237	do	do	8,390	1,194,000	
1238	do	do	9,120	1,388,000	
818*a*	do	Tulip Tree; Yellow Poplar; White Wood.	10,830	1,823,000	
818*b*	do	do	9,680	1,446,000	5,90
818*c*	do	do			5,64
818*c*	do	do			
211*a*	Asimina triloba	Papaw	4,480	631,000	
211*b*	do	do	4,150	514,000	
211*b*	do	do			
211*c*	do	do			3,02
211*c*	do	do			3,01
332	do	do	8,230	1,068,000	
479*a*	Anona glabra		9,000	694,000	
479*b*	do		8,400	643,000	
479*b*	do				
479*c*	do				4,17
479*c*	do				4,43
1131*a*	Canella alba	Cinnamon Bark	12,960	1,544,000	11,33

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Alabama	Cottage Hill	Rich loam	14.64	0	119	
do	do	do				
do	do	do				
do	do	do				
do	do	Swampy	10.54	22	91	
do	do	do				
do	do	do				
Virginia	do	do				
do	Wytheville	Clay limestone	7.79	14	26	
do	do	do				
	do	do				
Virginia						
do	Fancy Gap					
do	do					
do	do					
do	Selver's Mill	Rich, light				
do	do	do				
	do	do				
Alabama						
do						
do						
do						
Mississippi						
do	Quitman	Rich, low				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Virginia	Wytheville		2.83	8	15	Growth rapid.
do	do					Growth rapid.
do	Fancy Gap	Damp	3.35		20	One-half sap.
do	do	do				
do	do	do				
Michigan	Dansville	Sandy				
do	Lansing					
Pennsylvania	West Chester					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
West Virginia	Grafton					
do	do					
do	do					
do	do					
Missouri	Jefferson	Alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Tennessee	Cumberland River		3.39	Total	34	
Florida	Bay Biscayne	Swampy	9.44	do	47	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Elliott's Key	Coral	4.72	5	14	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. pe sq. in.
1181*b*	Canella alba	Cinnamon Bark	16,470	1,730,000	10,930
236*a*	Gordonia Lasianthus	Loblolly Bay	7,170	1,035,000	5,190
236*b*	do	do	9,750	1,051,000	5,110
414*a*	do	do	11,100	1,367,000	6,040
414*b*	do	do	10,440	1,120,000	5,690
2*a*	Tilia Americana	White Wood; Bass Wood	8,160	1,068,000	
2*a*	do	do			
2	do	do			3,810
1039*a*	do	do	7,930	1,085,000	
1039*b*	do	do	6,720	868,000	4,520
1039*c*	do	do			4,020
1039*e*	do	do			
252*a*	do	do	8,840	1,388,000	6,370
252*b*	do	do	11,530	1,446,000	6,480
252*c*	do	do			
252*e*	do	do			
316*a*	do	do	7,550	1,266,000	
316*a*	do	do			
316	do	do			5,610
124*c*	do	do			4,400
124*e*	do	do			
745*a*	do	Wahoo	8,160	1,173,000	
745*b*	do	do	7,850	1,085,000	
745*c*	do	do			5,600
745*e*	do	do			5,930
285$_1$	Tilia heterophylla	Bass Wood	5,790	990,000	4,370
285$_2$	do	do	7,550	990,000	4,930
285$_3$	do	do	7,780	1,139,000	4,560
820*a*	do	do	10,080	1,544,000	6,810
820*b*	do	do	10,230	1,388,000	7,360
1113*a*	Byrsonema lucida	Tallow Berry	6,100	772,000	5,560
1113*a*	do	do			
476	Guaiacum sanctum	Lignum-vitæ	9,000	1,178,000	10,600
1133	do	do	13,570	1,388,000	10,350
735*a*	Xanthoxylum Clava Herculis.	Prickly Ash	9,000	1,068,000	6,840
735*b*	do	do	10,150	1,005,000	
735*b*	do	do			
735	do	do			6,550
1086*a*	do	do	10,880	1,308,000	
1086*b*	do	do	6,720	857,000	
1086*c*	do	do			5,310
1086	do	do			6,850
1140*a*	Xanthoxylum Caribæum	Satin Wood; Yellow Wood	11,760	1,158,000	
1140*b*	do	do	9,830	1,510,000	9,920
1140*c*	do	do			9,560
1140*e*	do	do			
487*a*	Simarubra glauca	Bitterwood; Paradise Tree	8,400	1,242,000	
487*b*	do	do	7,780	1,283,000	
487*c*	do	do			6,490
487*e*	do	do			5,625
462*a*	Bursera gummifera	West Indian Birch	2,640	593,000	2,080
462*b*	do	do	1,600		2,310
475*a*	Amyris sylvatica	Torchwood	17,800	1,617,000	
475*b*	do	do	19,600	1,741,000	
475*c*	do	do			10,650
475*e*	do	do			
452*a*	Swietenia mahogoni	Mahogany	12,840	1,388,000	8,990
452*b*	do	do	15,930	1,688,000	
452	do	do			9,960
452	do	do			
280*a*	Ilex opaca	American Holly	10,080	846,000	
280*b*	do	do	9,610	890,000	6,520
280*b*	do	do			5,400
280	do	do			
280	do	do			
484*a*	Ilex Dahoon	Dahoon Holly	8,400	868,000	5,020
484*b*	do	do	8,000	927,000	
484*b*	do	do			
484	do	do			4,900
341	Cyrilla racemiflora	Leatherwood	4,500	662,000	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Florida	Elliott's Key	Coral		5	14	
South Carolina	Bonneau's Depot	Wet, fine, barren				
do	do	do				
do	Aiken	Swampy	12.99	25	22	
do	do	do				
Massachusetts	Brookline	Drift	18.50	26	9	
do	do	do				
do	do	do				
do	Danvers	Moist gravel	12.99	35	2	
do	do	do				
do	do	do				
do	do	do				
Missouri	Allenton	Alluvial	1.06	73	3	
do	do	do				
do	do	do				
do	do	do				
Michigan	Hersey	Rich loam				Sap.
do	do	do				Do.
do	do	do				Do.
do	Big Rapids	Gravelly				
do	do	do				
Georgia	Bainbridge	Low	11.81	0	23	
do	do	do				
do	do	do				
do	do	do				
Kentucky	Kentucky River	Limestone				Second growth.
do	Mercer	do				
do	do	do				
Tennessee	Cumberland River	Alluvial				
do	do	do				
Florida	No Name Key	Coral				
do	do	do				
do	U. Matacombe Key	do	7.00	55	18	
do	Elliott's Key	do				
do	Chattahoochee	Dry sandy				
do	do	do				
do	do	do				
do	do	do				
do	Palestine	Damp, sandy	13.86	10	20	
Texas	do	do				
do	do	do				
do	do	do				
Florida	Bahia Honda Key	Coral	5.35	54	4	
do	do	do				
do	do	do				
do	do	do				
do	Bay Biscayne	do				
do	do	do				
do	do	do				
do	do	do				
do	U. Matacombe Key	do				
do	do	do				
do	do	do				
do	do	do	5.04	0	61	
do	do	do	5.04	0	61	
do	do	do				
do	do	do	8.97	89	16	
do	do	do				
do	do	do				
do	do	do				
South Carolina	Waverly Mills	Sandy loam	5.67	0	35	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Bay Biscayne	Low, damp	5.06	0	29	
do	do	do				
do	do	do				
do	do	do				
Alabama	Chunchula	Damp, sandy	7.68		47	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continue

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. per sq. in.
338*a*	Cliftonia ligustrina	Ironwood	8, 230	1, 158, 000	
338*b*	do	do	6, 860	1, 158, 000	
338*b*	do	do			
338	do	do			5, 480
338	do	do			5, 070
454*a*	Reynosia latifolia	Darling Plum	11, 760	1, 618, 000	11, 940
454*a*	do	do			
460*a*	Condalia ferrea	Ironwood	16, 160	1, 478, 000	11, 030
460*b*	do	do	9, 760	1, 647, 000	11, 830
460*b*	do	do			
803*a*	Rhamnus Caroliniana	Buckthorn	7, 440	1, 162, 000	
803*a*	do	do			
803	do	do			6, 320
1094	do	do	8, 900	939, 000	
993*a*	Rhamnus Purshiana	Bear Berry	10, 750	1, 618, 000	8, 830
1139	Colubrina reclinata	Naked Wood	17, 460	1, 478, 000	
297*a*	Æsculus glabra	Ohio Buckeye	6, 710	1, 068, 000	4, 030
297*a*	do	do			
297*b*	do	do	6, 720	890, 000	
297	do	do			4, 430
386	do	do			4, 750
386	do	do			4, 630
427	do	do	7, 870	772, 000	
684*a*	Æsculus Californica	Horsechestnut; Buckeye	8, 920	914, 000	
684*b*	do	do	9, 300	1, 020, 000	
684*c*	do	do			4, 480
684*c*	do	do			
684	do	do			5, 625
944*e*	Ungnadia speciosa	Mexican Buckeye			5, 600
944*e*	do	do			
307*a*	Sapindus marginatus	Soap Berry; Wild China Tree	12, 880	1, 266, 000	
307*b*	do	do	13, 630	1, 502, 000	
307*c*	do	do			6, 940
307*c*	do	do			7, 680
928*a*	do	do	11, 760	1, 120, 000	
928*b*	do	do	10, 080	1, 024, 000	
928*c*	do	do			
928*c*	do	do			
928	do	do			6, 410
928	do	do			5, 720
463*a*	Hypelate paniculata	Madeira Wood; Honey Berry.	18, 070	1, 823, 000	9, 230
463*b*	do	do	16, 040	1, 580, 000	9, 720
464	Hypelate trifoliata	White Ironwood			6, 110
464	do	do			6, 370
982*a*	Acer macrophyllum	Oregon Maple	9, 990	1, 102, 000	
982*a*	do	do			
982*b*	do	do	9, 990	1, 068, 000	5, 810
982*b*	do	do			5, 710
1023*a*	do	do	9, 910	1, 510, 000	5, 260
1023*b*	do	do	9, 420	1, 243, 000	4, 910
1023	do	do			
1013*a*	Acer circinatum	Vine Maple	10, 220	1, 178, 000	
1014*a*	do	do	11, 760	1, 194, 000	6, 530
376*c*	Acer saccharinum	Sugar Maple; Rock Maple			7, 460
376*c*	do	do			
376	do	do	11, 710	1, 544, 000	
409*a*	do	do	9, 680	1, 698, 000	8, 060
298*c*	do	do			9, 730
298*c*	do	do			
299*a*	do	do	18, 500	1, 981, 000	9, 940
1233*a*	do	do	20, 130	3, 294, 000	9, 780
1233*b*	do	do	18, 500	2, 463, 000	8, 860
1234*a*	do	do	17, 720	2, 297, 000	8, 850
1234*b*	do	do	18, 420	2, 241, 000	8, 630
1235*a*	do	do	17, 810	2, 170, 000	7, 960
1235*b*	do	do	15, 830	2, 486, 000	8, 860

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Alabama	Cottage Hill	Wet	7.64	0	47	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	U. Metacombe Key	Coral	4.41	52	7	
do	do	do				
do	do	do	6.54	56	22	
do	do	do				
do	do	do				
do	Saint John's River	Rich hummock	4.25	10	19	
do	do	do				
do	do	do				
Arkansas	Jonesborough		2.32	0	14	
Oregon	Portland	Rich, alluvial				
Florida	Umbrella Key	Coral	3.94	24	13	
Missouri	Allenton	Rich, moist				
do	do	do				
do	do	do				
do	do	do				
do	do	Alluvial				
do	do	do				
Tennessee	Nashville	Rich, moist				
California	Marin	Rich	9.84		33	Total rings in heart and sap.
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Texas	New Braunfels	Limestone	4.90	0	26	
do	do	do				
do	Dallas	Rich, damp				
do	do	do				
do	do	do				
do	do	do				
do	Austin	Limestone	8.74	46	24	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Upper Metacombe Key.	Coral	10.31	80	15	
do	do	do				
do	do	do	9.61	72	13	
do	do	do				
Oregon	Portland	Rich, alluvial	9.02	40	30	
do	do	do				
do	do	do				
do	do	do				
do	Portland (Furniture Company).					
do	do					
do	do					
do	do					
Washington Territory.	Portland	Moist, alluvial				
	Wilkinson's	do				
Vermont	Charlotte	Gravelly				
do	do	do				
do	do	do				
Massachusetts	(Charlestown navy-yard.)					
Missouri	Allenton	Rich uplands				
do	do	do				
do	do	do				
Vermont	Charlotte					
do	do					
do	do					
do	do					
do	do					
do	do					

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continue

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. p sq. in.
1235	Acer saccharinum	Sugar Maple; Rock Maple			
213	Acer saccharinum, var. nigrum.	Black Maple	15, 130	1, 823, 000	7, 90
213*c*	do	do			
213*e*	do	do			
274*a*e	do	do			8, 95
274*a*e	do	do			
274	do	do	15, 130	1, 981, 000	
1167	do	do			8, 29
1167	do	do			8, 35
440	do	do	14, 700	2, 317, 000	
757*a*	do	do	13, 390	1, 446, 000	7, 27
757*b*	do	do	10, 675	1, 140, 000	
757*b*	do	do			
757	do	do			6, 13
1052*a*	Acer dasycarpum	White Maple; Silver Maple	14, 640	1, 835, 000	6, 85
743*a*	Acer rubrum	Red Maple; Swamp Maple	8, 610	1, 395, 000	
743*b*	do	do	11, 440	1, 741, 000	
743*c*	do	do			
743*e*	do	do			6, 43
743	do	do			6, 01
530*a*	do	do	11, 760	1, 823, 000	
530*b*	do	do	11, 590	1, 544, 000	
530*c*	do	do			
530*e*	do	do			7, 50
530	do	do			6, 49
20	do	do	10, 600	1, 283, 000	6, 83
20*c*	do	do			
20*e*	do	do			
878*a*	do	do	13, 450	1, 266, 000	
878*b*	do	do	12, 050	1, 283, 000	
878*c*	do	do			6, 19
878*e*	do	do			6, 56
1048*a*	do	do	11, 760	1, 314, 000	
1048*b*	do	do	13, 450	1, 416, 000	
1048*c*	do	do			
1048*e*	do	do			
1048	do	do			6, 25
1048	do	do			6, 55
311*a*	Negundo aceroides	Box Elder; Ash-Leaved Maple.	7, 320	708, 000	
311*b*	do	do	8, 460	797, 000	
311	do	do			4, 57
311	do	do			4, 52
290*a*	do	do	6, 370	868, 000	4, 52
290*b*	do	do	8, 170	1, 120, 000	4, 71
645*a*	Negundo Californicum	Box Elder; Soft Maple	11, 250	1, 478, 000	
645*b*	do	do	11, 590	1, 266, 000	
645*b*	do	do			
645*c*	do	do			5, 88
645*e*	do	do			6, 69
736*a*	Rhus copallina	Sumac	9, 940	914, 000	
736*b*	do	do	9, 070	1, 308, 000	
736*b*	do	do			
736	do	do			5, 36
330*e*	Rhus copallina, var. lanceolata.	do			6, 81
330*e*	do	do			
467*a*	Rhus Metopium	Coral Sumac; Bumwood	8, 840	1, 657, 000	
467*b*	do	do	9, 940	1, 741, 000	
467*c*	do	do			
467*e*	do	do			6, 98
467	do	do			8, 18
405*a*	Robinia pseudacacia	Locust; Yellow Locust	19, 520	3, 851, 000	
405*b*	do	do	21, 730	1, 872, 000	
405*c*	do	do			
405*e*	do	do			11, 55
405	do	do			11, 94
1247*a*	do	do	19, 900	2, 485, 000	8, 32
1247*b*	do	do	19, 430	2, 317, 000	10, 04

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Vermont	Charlotte					
do	do	Clay				
do						
do	do	do				
Missouri	do	do				
do	Allenton	Rich, alluvial				
do	do	do				
do	do	do				
do	do	do				
Tennessee	do	do				
Florida	Nashville	Rich				
do	Chattahoochee	Clay	10.55	51	0	
do	do	do				
do	do	do				
Massachusetts	do	do			52	Total rings, heart and sap.
Georgia	Topsfield	Low meadow				
do	Bainbridge	Low	9.92	54	22	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Mississippi	Kemper's Mill	Rich, swampy	8.74	0	41	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Brookline	Drift	11.22	36	18	
do	do	do				
do	do	do				
do	Danvers	Low	6.61	3	30	
do	do	do				
do	do	do				
do	do	do				
do	North Reading	do	8.03	6	60	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Texas	Dallas	Rich bottom				
do	do	do				
do	do	do				
do	do	do				
Missouri	Allenton	do				
do	do	do				
California	Contra Costa	Rich, moist	9.45		14	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Chattahoochee	Dry clay	6.89	19	5	
do	do	do				
do	do	do				
do	do	do				
Texas	Dallas	Dry, gravelly				
do	do	do				
	(Charlestown navy-yard.)					
	do					
	do					
	do					
New York	do					
do	Long Island					
	do					

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Contin

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. sq.
1248	Robinia pseudacacia	Locust; Yellow Locust	15,330	1,872,000	9,
1248*b*	do	do	20,050	2,241,000	10,
441*a*	do	do			9,
441*e*	do	do			
815*a*	do	do	14,940	1,510,000	
815*b*	do	do	12,200	1,730,000	
815*c*	do	do			
815*e*	do	do			7,
815	do	do			11,
1031*a*	Robinia Neo Mexicana		13,040	1,775,000	9,
1031*a*	do				
650*a*	Olneya Tesota	Ironwood	13,490	1,580,000	
650*b*	do	do	8,000	1,051,000	
650*e*	do	do			5,
650*c*	do	do			
564*a*	Piscidia Erythrina	Jamaica Dogwood	11,890	1,289,000	
564*b*	do	do	9,680	1,333,000	
564*e*	do	do			8,
564*c*	do	do			
33$_1$*a*	Cladrastis tinctoria	Yellow Wood	11,660	1,580,000	
33$_1$*a*	do	do			
33$_2$	do	do			8,
33	do	do	14,180	1,544,000	
439	do	do			6,
329*a*	Sophora affinis		11,760	1,237,000	6,
932*a*	do		11,440	1,544,000	9,
296	Gymnocladus Canadensis	Kentucky Coffee Tree			8,
519*a*	do	do	10,080	1,173,000	5,
1241*a*	do	do	11,670	1,657,000	5,
1242*a*	do	do	11,030	1,536,000	4,
1243*a*	do	do	11,510	1,741,000	4,
53$_2$*a*	Gleditschia triacanthos	Honey Locust	13,880	1,981,000	6,
53$_2$*b*	do	do	13,040	1,823,000	7,
444*a*	do	do	12,810	1,266,000	7,
760*a*	Gleditschia monosperma	Water Locust	15,400	1,775,000	
760*b*	do	do	14,100	1,647,000	
760*c*	do	do			8,
760*e*	do	do			7,
678*a*	Parkinsonia Torreyana	Palo Verde	7,320	731,000	5,
678*b*	do	do	8,310	914,000	6,
436*a*	Cercis Canadensis	Red Bud; Judas Tree	14,410	1,446,000	7,
1089*a*	do	do	10,520	902,000	7,
1090*a*	do	do	9,300	846,000	5,
1091*a*	do	do	7,390	1,153,000	6,
927*a*	Prosopis juliflora, Algaroba.	Meskit; Honey Locust	5,920	723,000	
927	do	do			6,
680*a*	do	do	6,720	772,000	
680*b*	do	do	8,230	952,000	
680*b*	do	do			
680	do	do			8,
680	do	do			9,
658*a*	Prosopis pubescens	Tornilla; Screw Bean; Screw Pod; Meskit.	12,960	1,215,000	8,
658*b*	do	do	12,730	1,199,000	10,
697*a*	Acacia Greggii	Cat's-claw	11,360	1,618,000	11,
509*a*	Lysiloma latisiliqua	Wild Tamarind			6,
509	do	do	7,930	620,000	
1112*a*	do	do			7,
1112*e*	do	do			
48$_1$*a*	Chrysobalanus Icaco	Cocoa Plum	13,800	1,885,000	
480*a*	do	do			
68*a*	Prunus Americana	Wild Plum; Canada Plum	9,300	1,085,000	7,
68*b*	do	do	10,080	1,194,000	7,
334*a*	do	do	17,760	1,478,800	9,
435*a*	Prunus angustifolia	Chickasaw Plum	6,720	816,000	5,
233*e*	Prunus Pennsylvanica	Pigeon Cherry			5,
233*e*	do	do			5,

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
.....	(Saw-mill)	.....	.....	.....	.....	
.....	...do	.....	.....	.....	.....	
Tennessee	Nashville	Limestone	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
West Virginia	Grafton	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
Colorado	Trinidad	Low, moist	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
California	Lower Colorado Valley.	Dry, gravelly	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Florida	Upper Metacombe Key.	Coral	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Kentucky	Mercer	Limestone	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
....do	....do	... do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Tennessee	Nashville	Alluvial	.....	.....	.....	
Texas	Dallas	Dry, calcareous	.....	.....	.....	
....do	Austin	.. do	.....	.....	.....	
Missouri	Allenton	Low, rich	.....	.....	.....	
Tennessee	Nashville	Limestone	.....	.....	.....	
.....	(Saw-mill)	.....	.....	.....	.....	
.....	....do	.....	.....	.....	.....	
.....	....do	.....	.....	.....	.....	
Missouri	Allenton	Low, rich	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Tennessee	Nashville	Dry, sandy, barren ..	.....	.....	.....	
Florida	Chattahoochee	Alluvial	11.57	26	21	
....do	....do	....do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Arizona	Lower Colorado Riv.	Sandy	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Tennessee	Nashville	Limestone	.....	.....	.....	
Missouri	Allenton	Rich	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Texas	Austin	Rich, calcareous	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Arizona	Tucson	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
....do	....do	.....	.....	.....	.....	
California	Fort Yuma	Sandy	.....	.....	.....	
....do	....do	....do	.....	.....	.....	
Arizona	Santa Rita Mount'ns	Dry mesa	7.95	29	14	
Florida	Boca Chica Key	Coral	.....	.....	.....	
... do	....do	....do	.....	.....	.....	
....do	Key Largo	....do	.....	.....	.....	Rough bark.
....do	....do	....do	.....	.....	.....	
....do	Bay Biscayne	Swampy	3.94	0	47	
....do	... do	... do	.....	.....	.....	
Missouri	Allenton	Rich upland	.....	.....	.....	
....do	....do	.. do	.....	.....	.....	
Texas	Dallas	Rich	.....	.....	.....	
Tennessee	Nashville	River bluff	.....	.....	.....	
Vermont	Charlotte	Cold, gravelly	.....	.....	.....	
....do	....do	....do	.....	.....	.....	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. per sq. in.
606s	Prunus umbellata	Hog Plum			7, 00
606s	do	do			
968a	Prunus emarginata, var. mollis.	Wild Cherry	9, 830	1, 388, 000	
968b	do	do	9, 610	1, 478, 000	5, 9
968	do	do			7, 1
15a	Prunus serotina	Wild Cherry; Rum Cherry	16, 800	1, 333, 000	
15a	do	do			
15b	do	do			9, 0
15b	do	do	15, 710	1, 120, 000	9, 1
1053a	do	do	11, 770	1, 139, 000	
1053b	do	do	11, 770	1, 242, 000	
1053e	do	do			
1053e	do	do			
1053	do	do			7, 1
1053	do	do			7, 6
868a	do	do	11, 010	1, 388, 000	8, 0
406a	do	do	9, 220	1, 136, 000	5, 8
115a	do	do	8, 310	990, 000	6, 4
115a	do	do	10, 370	1, 260, 000	
115	do	do			7, 7
317a	do	do	9, 880	1, 178, 000	6, 9
317b	do	do	9, 910	1, 153, 000	7, 4
127a	do	do	12, 960	1, 388, 000	
127b	do	do	14, 300	1, 260, 000	
127e	do	do			
127e	do	do			
127	do	do			8, 5
127	do	do			7, 9
148	do	do	13, 450	1, 265, 000	8, 1
763a	do	do	11, 440	1, 333, 000	
763b	do	do	11, 360	1, 544, 000	
763e	do	do			
763e	do	do			
763	do	do			7, 8
763	do	do			8, 5
418e	Prunus Capuli	Ceresa Mexican			7, 6
418e	do	do			
637a	Prunus demissa		9, 910	1, 035, 000	7, 2
1032e	Prunus Caroliniana	Mock Orange; Wild Olive; Wild Peach.			6, 9
1032	do	do	8, 400	1, 055, 000	
1062a	do	do	18, 150	1, 446, 000	
1062b	do	do	13, 340	1, 446, 000	8, 5
1062e	do	do			
1062e	do	do			8, 4
1158a	Prunus ilicifolia	Islay	10, 675	1, 032, 000	
1158b	do	do	11, 770	1, 007, 000	
1158e	do	do			
1158e	do	do			7, 7
883e	Cercocarpus ledifolius	Mountain Mahogany			
883e	do	do			9, 3
808e	Prius coronaria	American Crab Apple			
808e	do	do			6, 9
808	do	do			6, 6
1087a	do	do	6, 330	1, 068, 000	
1087a	do	do			
1087b	do	do	6, 070	1, 036, 000	6, 1
1087b	do	do			5, 2
1088a	do	do	6, 490	723, 000	5, 6
1088b	do	do	8, 920	868, 000	5, 2
214e	Pirus Americana	American Mountain Ash			
214e	do	do			5, 6
365	do	do			5, 2
410a	Pirus sambucifolia	Mountain Ash	6, 400	816, 000	5, 4
363a,e	Cratægus arborescens	Thorn			5, 8
607a	do	do	11, 440	1, 116, 000	7, 4
607b	do	do	6, 370	1, 120, 000	7, 9
328a	Cratægus crus-galli	Cockspur Thorn	8, 870	868, 000	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Georgia	Altamaha River	Clay	8.50	24	21	
do	do	do				
Washington Territory.	Wilkinsons	Low, rich				
do	do	do				
do	do	do				
Massachusetts	Roxbury		8.07	31	9	
do	do					
do	do					
do	do					
do	Topsfield	Gravelly	12.60	33	11	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Vermont	Charlotte	do				
Virginia and Middle States.	(Charlestown navy-yard.)					
Michigan	Dansville	Gravelly				
do	do	do				
do	do	do				
do	Hersey					
do	do					
Missouri	Allenton	Rich				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Illinois	Waukegan	Gravelly				
Florida	Chattahoochee	Clay				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
New Mexico	Pinos Altos Mountains.	Alluvial				
do	do	do				
California	Strawberry Valley	Low, rich				
Florida	Jacksonville	Sandy				
do	do	do				
Texas	Victoria	Rich, moist	7.09	34	26	
do	do	do				
do	do	do				
do	do	do				
California	Santa Cruz		8.11	0	80	
do	do					
do	do					
do	do					
Utah	City Creek Cañon	Rocky				
do	do	do				
Delaware	Kiamensi	Clay				
do	do	do				
do	do	do				
Pennsylvania	Nazareth	Moist				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Vermont	Charlotte	Gravelly				
do	do	do				
do	Huntingdon	do				
do	Mount Mansfield	do	4.17	0	17	
South Carolina	Aiken	Rich				
Georgia	Ogeechee	Low	6.61	0	46	
do	do	do				
Massachusetts	Brookline	Loam				Cultivated.

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. per sq. in.
328*b*	Cratægus crus-galli	Cockspur Thorn	8,400	739,000	
328*e*	do	do			5,160
328*f*	do	do			5,360
1093*a*	do	do	10,080	1,139,000	6,530
1093*b*	do	do	10,140	1,199,000	7,420
949*a*	Cratægus subvillosa	Sweet Haw	12,350	1,289,000	
949*a*	do	do			
949	do	do			7,650
1081*b*	do	do	8,840	1,333,000	7,660
426*a*	Cratægus tomentos	Black Thorn; Bear Thorn	10,000	1,051,000	6,610
426*a*	do	do			6,040
426*b*	do	do	10,293	1,153,000	
426*b*	do	do			
926*a*	Cratægus spathulata	Hog's Haw	7,260	902,000	6,470
239*a*	Cratægus æstivalis	May Haw; Apple Haw	10,220	836,000	6,330
767*a*	Cratægus flava, var. pubescens.	Haw	10,380	966,000	7,500
156	Amelanchier Canadensis	June Berry; Shad Bush; Service Berry.			6,610
241*a*	do	do	18,020	1,776,000	10,040
849*a*	do	do	15,580	1,730,000	
849*b*	do	do	15,180	1,823,000	9,250
849*e*	do	do			9,270
849*e*	do	do			
546*a*	Liquidambar styraciflua	Liquid Amber; Sweet Gum; Bilsted.	7,470	879,000	
546*b*	do	do	9,580	952,000	
546*c*	do	do			6,040
546*e*	do	do			5,770
546*f*	do	do			
546*f*	do	do			
1095*a*	do	do	11,130	1,395,000	
1095*b*	do	do	10,080	1,446,000	
1095*e*	do	do			6,980
1095*e*	do	do			7,020
1173*a*	do	do	10,750	1,120,000	5,630
1173*b*	do	do	10,600	1,395,000	
1173*e*	do	do			5,690
1173*e*	do	do			
1181*a*	do	do	7,930	1,158,000	
1181*b*	do	do	7,810	1,308,000	
1181*e*	do	do			
1181*e*	do	do			7,000
1181	do	do			6,170
1182*a*	do	do	9,610	1,510,000	
1182*b*	do	do	8,810	1,388,000	
1182	do	do			7,620
1182	do	do			7,300
1183*a*	do	do	9,480	1,388,000	
1183*b*	do	do	8,840	1,333,000	
1183*e*	do	do			7,240
1183*f*	do	do			7,060
485*a*	Rhizophora Mangle	Mangrove	19,060	2,817,000	
485*b*	do	do	15,860	2,485,000	12,020
485	do	do			12,460
489*a*	Conocarpus erecta	Button Tree; Buttonwood	11,910	1,424,000	
489*b*	do	do	15,130	1,730,000	8,540
489*b*	do	do			
489	do	do			8,510
507*a*	Laguncularia racemosa	Black Buttonwood; White Mangrove.	3,920	990,000	
507*a*	do	do			6,410
507*b*	do	do	10,950	1,220,000	6,370
1118*a*	Eugenia buxifolia	Stopper; Gurgeon Stopper	15,130	2,170,000	
1118*a*	do	do			12,620
1135*e*	Eugenia monticola	White Stopper			7,780
1135*e*	do	do			7,940
1135	do	do	16,800	1,657,000	
1127*a*	Eugenia procera	Red Stopper	16,900	1,730,000	
1127*b*	do	do	16,800	1,688,000	
1127	do	do			9,730

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Massachusetts	Brookline	Loam				
do	do	do				
do	do	do				
Missouri	Allenton	Low, wet				
do	do	do				
Texas	Victoria	Alluvial	7.09	0	61	
do	do	do				
do	do	do				
Missouri	Saint Louis		4.17	0	28	
Tennessee	Nashville	Limestone				
do	do	do				
do	do	do				
do	do	do				
Louisiana	Webster Parish	Clay				
South Carolina	Bonneau's Depot	Damp, rich				
Florida	Aspaloga	Dry clay	5.59	0	44	
Vermont	Charlotte	Gravelly				
Kentucky	Brumfield		5.51	60	34	
Massachusetts	Danvers	Loam	7.48	21	43	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Alabama	Kemper's Mill	Rich, alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Arkansas	Little Rock					
do	do					
do	do					
do	do					
New Jersey	Mount Holly	Clay	8.19	17	30	
do	do	do				
do	do	do				
do	do	do				
Mississippi	Yazoo Bottom	Alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Bay Biscayne	Swampy	9.84	50	31	
do	do	do				
do	do	do				
do	do	do	6.46	34	15	
do	do	do				
do	do	do				
do	do	do				
do	Sugarloaf Sound	do				
do	do	do				
do	do	do				
do	Lostman River	Coral				
do	do	do				
do	Umbrella Key	do				
do	do	do				
do	do	do				
do	Miami	do	5.52	0	87	
do	do	do				
	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. per sq. in.
1127	Eugenia procera	Red Stopper			9, 460
67*a*	Cornus florida	Dogwood	12, 520	1, 199, 000	8, 250
67*b*	do	do	14, 530	1, 308, 000	8, 510
1077*a*	do	do	14, 560	1, 237, 000	8, 000
1077*b*	do	do	13, 850	1, 478, 000	7, 980
1092*a*	do	do	10, 190	966, 000	7, 300
761*a*	do	do	11, 770	1, 139, 000	6, 250
812*a*	do	do	13, 650	1, 306, 000	7, 760
812*a*	do	do			
812*b*	do	do	12, 730	1, 243, 000	6, 770
960*a*	Cornus Nuttallii		13, 360	1, 730, 000	9, 280
360*b*	do		15, 100	1, 741, 000	9, 620
605*a*	Nyssa capitata	Ogeechee Lime; Sour Tupelo	9, 940	952, 000	6, 130
605*b*	do	do	9, 580	1, 068, 000	
813*a*	Nyssa sylvatica	Tupelo; Sour Gum; Pepperidge; Pear Oak.	11, 210	1, 199, 000	
813*b*	do	do	13, 040	1, 787, 000	
813*c*	do	do			7, 480
813*e*	do	do			7, 300
750*a*	do	do	14, 300	1, 283, 000	
750*b*	do	do	13, 660	1, 139, 000	
750*c*	do	do			
750*e*	do	do			
750	do	do			7, 020
750	do	do			7, 220
833*a*	do	do	13, 080	1, 139, 000	
833*b*	do	do	12, 690	1, 544, 000	
833*c*	do	do			7, 300
833*e*	do	do			6, 830
833*f*	do	do			
833*f*	do	do			
834*c*	do	do			
834*e*	do	do			5, 850
834	do	do	11, 890	1, 102, 000	6, 570
834	do	do	13, 250	1, 333, 000	
835*c*	do	do			
835*e*	do	do			
835	do	do	10, 290	936, 000	6, 240
835	do	do			6, 380
517*a*	do	do	9, 830	1, 158, 000	6, 530
235*a*	do	do	11, 220	1, 314, 000	
235*b*	do	do	10, 675	1, 158, 000	
128*a*	Nyssa uniflora	Large Tupelo; Cotton Gum	10, 060	923, 000	
128*b*	do	do	10, 400	809, 000	
128*c*	do	do			5, 690
128*e*	do	do			5, 625
550*a*	do	do	8, 990	763, 000	
550*b*	do	do	9, 830	816, 000	
550*c*	do	do			
550*e*	do	do			
550	do	do			4, 480
550	do	do			5, 080
604*a*	do	do	9, 120	614, 000	
604*b*	do	do	7, 930	579, 000	
604	do	do			5, 440
604	do	do			4, 880
681*a*	Sambucus glauca	Elder	5, 340	496, 000	3, 910
370	Viburnum Lentago	Sheep Berry			7, 900
110*a*	Viburnum prunifolium	Black Haw	10, 440	1, 333, 000	9, 030
110*a*	do	do	17, 610	1, 698, 000	9, 180
739*a*	do	do	12, 900	1, 085, 000	7, 060
466*a*	Exostemma caribæum		13, 720	1, 478, 000	11, 890
466*b*	do		15, 130	1, 981, 000	9, 480
466*c*	do				
466*e*	do				
381*a*	Pinckneya pubens	Georgia Bark	5, 820	939, 000	3, 870
343*c*	Vaccinium arboreum	Farkleberry Haw			5, 220
343	do	do			6, 130
1033*a*	Andromeda ferruginea		9, 760	1, 158, 000	6, 940
643*a*	Arbutus Menziesii	Madrona	12, 810	1, 220, 000	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Florida	Miami	Coral				
Missouri	Allenton	Upland	5.63	Tot'l	47	
do	do	do				
do	do	Gravelly	4.80	7	44	
do	do	do				
do	do	Flinty				
Florida	Chattahoochee	Calcareous	5.04	0	72	
West Virginia	Grafton	Dry				
do	do	do				
do	do	do				
Oregon	Portland					
do	do					
Georgia	Ogeechee River	Swampy	8.66	.0	27	
do	do	do				
West Virginia	Grafton					
do	do					
do	do					
do	do					
Florida	Chattahoochee	Clay	8.42	0	49	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	West Newbury	Rich	10.08	32	66	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Chebacco Pond					
do	do					
do	do					
do	do					
Tennessee	Cumberland River					
South Carolina	Bonneau's Depot	Muck				
do	do	do				
do	do	Swampy				
do	do	do				
do	do	do				
do	do	do				
Alabama	Stockton	Alluvial	12.60	19	67	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Georgia	Ogeechee River	Swampy				
do	do	do				
do	do	do				
do	do	do				
California	Contra Costa	Gravelly	12.60	28	6	
Vermont	Hinesburg	Swampy				
Kentucky	Mercer	Trenton limestone				
do	do	do				
Georgia	Bainbridge	Clay	2.99		36	
Florida	U. Metacombe Key	Coral	3.11	25	28	
do	do	do				
do	do	do				
do	do	do				
South Carolina	Bluffton	Sandy swamp	4.25	34	5	
Alabama	Citronelle	Sandy	5.00	0	65	
do	do	do				
Florida	Jacksonville	Hummock				
California	Contra Costa	Gravelly				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continue

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. per sq. in.
643*b*	Arbutus Menziesii	Madrona	11, 860	914, 000	6, 900
643	do	do			6, 420
679*a*	do	do	14, 560	1, 657, 000	6, 690
679*b*	do	do	12, 880	1, 283, 000	
679	do	do			8, 490
683*a*	Arbutus Xalapensis		9, 880	1, 020, 000	
683*b*	do		7, 850	797, 000	6, 330
683	do				5, 080
353*a*	Oxydendrum arboreum	Sorrelwood; Sourwood	6, 720	1, 158, 000	6, 600
353*b*	do	do	14, 200	1, 446, 000	6, 980
515*c*	do	do			7, 820
515*e*	do	do			
262$_2$*a*	Kalmia latifolia	Laurel; Calico Bush; Spoonwood; Ivy.	9, 990	976, 000	6, 160
262$_3$*a*	do	do	8, 390	770, 000	6, 090
263*a*	Rhododendron maximum	Big Laurel	9, 910	990, 000	5, 850
263$_1$*a*	do	do	9, 070	890, 000	6, 630
492*a*	Chrysophyllum oliviforme	Satin Wood	13, 570	1, 981, 000	9, 270
492*b*	do	do	11, 010	1, 544, 000	7, 740
461*a*	Sideroxylon mastichodendron.	Mastic	13, 190	1, 981, 000	
461*b*	do	do	14, 710	1, 618, 000	
461*e*	do	do			9, 720
461*f*	do	do			8, 790
488*a*	Dipholis salicifolia	Red Stopper; Cassada Bustic	18, 130	2, 170, 000	10, 625
488*b*	do	do	16, 800	1, 981, 000	11, 170
500*a*	do	do	14, 460	1, 647, 000	10, 020
500*b*	do	do			9, 720
500*b*	do	do			
746*a*	Bumelia tenax	Black Haw	9, 640	1, 068, 000	6, 480
1083*a*	Bumelia lanuginosa	Gumelastic Tree; Prickly Ash.	4, 730	694, 000	6, 130
930*a*	do	do	8, 160	715, 000	
930*b*	do	do	8, 810	680, 000	
930	do	do			4. 880
930	do	do			4, 460
333*a*	Bumelia lycioides	Ironwood; Southern Buckthorn.	8, 080	1, 266, 000	
333	do	do			6, 960
1124*a*	Bumelia cuneata	Downward Plumb			6, 790
458*a*	Mimusops Sieberi	Naseberry	13, 650	1, 510, 000	
458*b*	do	do	12, 500	1, 446, 000	7, 920
458	do	do			5, 160
61*a*	Diospyros Virginiana	Persimmon	10, 290	1, 102, 000	
61*b*	do	do	11, 740	1, 068, 000	6, 650
61*c*	do	do			7, 020
1084*a*	do	do	13, 390	1, 266, 000	7, 380
1084*b*	do	do	12, 670	1, 102, 000	7, 140
1162*a*	do	do			7, 480
1162*c*	do	do			7, 020
1162	do	do	12, 120	902, 000	
425*a*	do	do	18, 500	1, 835, 000	8, 080
811*a*	do	do	12, 820	902, 000	6, 570
811*a*	do	do			
811*b*	do	do	12, 690	857, 000	
811	do	do			7, 020
347*c*	Symplocos tinctoria	Horse Sugar; Sweet Leaf; Gumwood.			5, 460
347*e*	do	do			
347	do	do	8, 870	902, 000	
738*a*	Halesia diptera	Snow Drop Tree	12, 630	1, 005, 000	5, 770
738*b*	do	do	11, 920	1, 051, 000	6, 570
660*a*	Fraxinus pistaciæfolia		9, 540	816, 000	
660*b*	do		8, 310	890, 000	5, 730
660	do				5, 220
39$_2$	Fraxinus Americana	White Ash	13, 240	1, 925, 000	
39$_2$*c*	do	do			6, 690
130*a*	do	do	13, 950	1, 981, 000	8, 190
130*b*	do	do	13, 650	1, 873, 000	7, 740
114*a*	do	do	8, 400	739, 000	

TABLE 4.—CONSOLIDATFD TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
California	Contra Costa	Gravelly				
....do	....do	....do				
....do	Marin	....do				
....do	....do	....do				
....do	....do	....do				
(Saw-mill)	Santa Rita Mount'ins					
....do	....do					
....do	....do					
Alabama	Cottage Hill	Light, rich	5.12	0	28	
....do	....do	....do				
Tennessee	Nashville	Sandy rock				
....do	....do	....do				
Virginia	Fancy Gap	Damp	3.23	0	74	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Florida	Bay Biscayne	Coral	4.13	0	18	
....do	....do	....do				
....do	U. Metacombe Key	....do	10.47	49	29	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	Bay Biscayne	....do	6.69	14	36	
....do	....do	....do				
....do	Umbrella Key	....do	5.91	75	7	
....do	....do	....do				
....do	....do	....do				
Georgia	Bainbridge	Low	5.04	0	29	
Missouri	Allenton	Limestone				
Texas	Austin	....do	9.33	0	65	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Tennessee	Nashville	Alluvial				
....do	....do	....do				
Florida	Long Key	Coral				
....do	U. Metacombe Key	....do	6.69	36	12	
....do	....do	....do				
....do	....do	....do	6.69	36	12	
Missouri	Allenton	Rich upland	6.22	Tota	l, 56	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	Rich				Wood with black streaks.
....do	....do	....do				Do.
....do	....do	....do				Do.
Tennessee	Nashville	Rich loam				Female.
West Virginia	Grafton					
....do	....do					
....do	....do					
....do	....do					
Alabama	Cottage Hill	Sandy	5.27	0	26	
....do	....do	....do				
....do	....do	....do				
Georgia	Bainbridge	Low				
....do	....do	....do				
Arizona	Santa Rita Mount'ns	....do				
....do	....do	....do				
....do	....do	....do				
Missouri	Allenton	Alluvial				
....do	....do	....do				
South Carolina	Bonneau's Depot	Wet				
....do	....do	....do				
Michigan	Dansville	Clay				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. p sq. in
114*a*	Fraxinus Americana	White Ash			
114*b*	do	do	8, 870	939, 000	5, 20
114*b*	do	do			4, 96
114*c*	do	do	14, 990	1, 823, 000	8, 47
114*d*	do	do	13, 950	1, 981, 000	8, 83
114*d*	do	do	10, 640	1, 333, 000	5, 12
144	do	do			6, 33
212*a*	do	do	12, 260	1, 741, 000	
212*b*	do	do	13, 020	1, 544, 000	
212*c*	do	do			7, 10
212*c*	do	do			6, 90
267$_1$	do	do			5, 73
267$_2$	do	do	11, 770	1, 510, 000	
267$_3$	do	do			5, 79
227*a*	do	do	11, 660	1, 544, 000	
227$_1$*a*	do	do	12, 350	1, 478, 000	
227$_1$	do	do			6, 47
227$_2$	do	do	15, 170	1, 981, 000	
227*c*	do	do			6, 65
227*c*	do	do			6, 53
431*a*	do	do	13, 880	1, 775, 000	7, 42
551*a*	do	do	11, 530	1, 741, 000	
551*b*	do	do	10, 940	1, 260, 000	
551*c*	do	do			6, 61
551*c*	do	do			
551	do	do			5, 99
747*a*	do	do	5, 950	939, 000	4, 50
747*b*	do	do	9, 940	826, 000	4, 52
1045*a*	do	do	14, 610	1, 647, 000	
1045*b*	do	do	15, 800	1, 647, 000	
1045	do	do			7, 90
1045	do	do			7, 72
864*a*	Fraxinus Americana, var. Texensis.	Blue Ash	16, 000	1, 388, 000	
864*b*	do	do	16, 270	1, 571, 000	
864*c*	do	do			
864*c*	do	do			
864	do	do			8, 39
864	do	do			7, 02
937*a*	do	do	8, 770	1, 024, 000	6, 47
139	Fraxinus pubescens	Red Ash; Bastard Ash	15, 400	1, 873, 000	
229$_1$	do	do	11, 190	1, 001, 000	
229$_1$	do	do	14, 912	1, 388, 000	
229$_2$*c*	do	do			7, 38
229$_2$*c*	do	do			
229$_2$	do	do			7, 17
1059*a*	do	do	8, 360	554, 000	4, 01
57*a*	Fraxinus viridis	Green Ash	11, 690	816, 000	5, 77
308*a*	do	do	7, 810	868, 000	
308*b*	do	do	11, 770	1, 395, 000	
308*c*	do	do			6, 53
308*f*	do	do			5, 18
957*a*	do	do	13, 450	1, 120, 000	
957*b*	do	do	16, 900	2, 170, 000	
957*b*	do	do			
957	do	do	12, 570	1, 085, 000	7, 02
957	do	do			6, 81
948*a*	do	do	13, 570	1, 158, 000	
948*b*	do	do	14, 150	1, 510, 000	
948*b*	do	do			8, 67
948	do	do			7, 20
438*a*	do	do	13, 800	1, 741, 000	7, 66
536*a*	Fraxinus platycarpa	Water Ash	7, 700	731, 000	3, 57
125*a*	Fraxinus quadrangulata	Blue Ash	9, 730	1, 085, 000	5, 62
125*b*	do	do	9, 070	1, 068, 000	
125*b*	do	do			
66*a*	do	do	13, 650	1, 085, 000	7, 78
66*b*	do	do	13, 620	1, 333, 000	8, 37
291*a*	do	do	10, 530	1, 068, 000	6, 09
518*a*	do	do	10, 490	990, 000	7, 65

TABLE 4.—CONSOLIDATED TABULATION OF RESUSTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Michigan	Dansville	Clay				
....do	....do	....do				
....do	....do	....do				
....do	Hudson					
....do	Lansing	Clay				
....do	Dansville	....do				
Illinois	Waukegan	....do				Second growth rapid.
Virginia	Wytheville					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Vermont	Charlotte	Gravelly				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	Swampy				
... do	....do	....do				
Tennessee	Nashville	Limestone				
Alabama	Kemper's Mill	Alluvial	10.55	0	79	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
... do	....do	....do				
Georgia	Bainbridge	River bottom	10.24		95	
....do	....do	....do				
Massachusetts	Reading		8.46	Total	64	
....do	....do					
... do	....do					
....do	....do					
Texas	Dallas	Dry, calcareous	15.12		69	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
... do	Austin	Rich, calcareous				
Michigan	Lansing	Poor				
Vermont	Charlotte	Clay				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
... do	....do	....do				
Massachusetts	Topsfield	River, bottom		Total	59	
Missouri	Allenton	Rich, wet				
Texas	Dallas	....do	20.16	42	45	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	Matagorda Bay	....do	7.24		34	
....do	...do	....do				
....do	....do	... do				
....do	... do	....do				
....do	....do	....do				
....do	Victoria	....do	5.67	0	31	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Tennessee	Nashville	Rich upland				
Alabama	Stockton	Rich, alluvial	8.54	0	27	
Michigan	Lansing	Rich loam				
....do	....do	....do				
....do	....do	....do				
Missouri	Allenton	Dry upland	5.43	Total	35	
....do	...do	....do				
....do	.. do	Sandy loam				
Tennessee	Nashville	Rich limestone				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. p sq. in
286$_{1}$*a*	Fraxinus quadrangulata	Blue Ash	15, 830	1, 544, 000	8, 31
286$_{2}$*a*	do	do	10, 250	994, 000	7, 49
964*a*	Fraxinus Oregana	Ash; Oregon Ash	11, 770	1, 360, 000	
964*b*	do	do	10, 860	1, 502, 000	
964*c*	do	do			8, 67
964*e*	do	do			
964	do	do			7, 06
1001*a*	do	do	11, 530	1, 340, 000	
1001*b*	do	do	10, 450	1, 178, 000	
1001*e*	do	do			7, 82
1001*f*	do	do			8, 06
1024*a*	do	do	5, 020	680, 000	5, 73
1024*a*	do	do			4, 94
1024*b*	do	do	5, 050	603, 000	
1030*a*	do	do	10, 600	1, 580, 000	8, 19
1030*b*	do	do	10, 980	1, 730, 000	8, 71
122*a*	Fraxinus sambucifolia	Black Ash	8, 780	1, 158, 000	5, 54
147	do	do	14, 028	1, 657, 000	
839*a*	do	do	11, 770	1, 158, 000	
839*b*	do	do	11, 650	1, 020, 000	
839*e*	do	do			
839*e*	do	do			
839	do	do			6, 77
839	do	do			5, 73
737*a*	Forestiera acuminata		10, 030	816, 000	
737*b*	do		10, 520	1, 085, 000	
737*e*	do				5, 71
737*e*	do				
283*a*	Osmanthus Americanus	Wild Olive; Devil Wood	17, 230	2, 103, 000	
283*b*	do	do	14, 550	2, 040, 000	
283*e*	do	do			8, 05
283*f*	do	do			8, 66
584*e*	do	do			
584*e*	do	do			7, 22
584	do	do	13, 450	1, 688, 000	7, 80
1137*a*	Bourreria Havanensis	Strong Bark	13, 572	1, 618, 000	7, 44
1137*e*	do	do			6, 92
1137*e*	do	do			
942*e*	Ehretia elliptica				
942*e*	do				5, 60
942	do		10, 370	529, 000	5, 40
540*e*	Catalpa bignonioides	Catalpa			6, 07
540	do	do	9, 770	1, 035, 000	
744*a*	do	do	7, 550	926, 000	
744*b*	do	do	6, 720	710, 000	
744*b*	do	do			5, 00
744*c*	do	do	9, 930	1, 388, 000	
744	do	do			4, 46
38*a*	Catalpa speciosa	Western Catalpa	9, 640	1, 308, 000	
38*b*	do	do	8, 540	1, 178, 000	
38*b*	do	do			
38	do	do			5, 93
38	do	do			5, 67
682*a*	Chilopsis saligna	Desert Willow; Flowering Willow.	9, 880	846, 000	4, 23
682	do	do	6, 720	731, 000	
490*a*	Avicennia nitida	Black Mangrove	10, 000	1, 687, 000	
490*b*	do	do	16, 770	1, 939, 000	
490*e*	do	do			
490*e*	do	do			9, 78
490	do	do			9, 84
474*e*	Pisonea obtusa				4, 80
474*e*	do	do			4, 02
474	do	do	4, 270	662, 000	
473*a*	Coccoloba Floridana	Pigeon Plum	13, 450	1, 823, 000	
473*b*	do	do	12, 880	1, 544, 000	
473*e*	do	do			10, 93
473*e*	do	do			11, 01
453*e*	Coccoloba uvifera	Sea Grape			3, 47
453	do	do			3, 87

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Kentucky	Mercer	Limestone				
do	do	do				
Oregon	Portland	Low, wet	13.98	47	46	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	(Weidler's saw-mill)					
do	do					
do	do					
do	do					
do	Portland (Furniture Company).					Brash.
do	do					
do	do					
do	do					
do	do					
Michigan	Dansville	Wet, peaty				
Illinois	Waukegan	Low, wet				
Massachusetts	Danvers	Rich, loamy				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Georgia	Ogeechee River	Rich, moist	5.91	0	55	
do	do	do				
do	do	do				
do	do	do				
Louisiana	Amite	Rich, alluvial				
do	do	do				
do	do	do				
do	do	do				
Florida	Saint John's River	Sandy loam	7.48	19	45	
do	do	do				
do	do	do				
do	U. Metacombe Key	Coral	3.62		45	
do	do	do				
do	do	do				
Texas	New Braunfels	Rich, alluvial	6.69		25	
do	do	do				
do	do	do				
Alabama	Stockton	Low, wet				
do	do	do				
Georgia	Bainbridge	Clay	9.37	17	3	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Missouri	Charleston	Wet clay	11.34	51	8	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Arizona	Tucson	Moist, gravelly				
do	do	do				
Florida	Bay Biscayne	Coral	6.22	18	39	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	U. Metacombe Key	do				
do	do	do				
do	do	do				
do	do	do	6.14	27	48	
do	do	do				
do	do	do				
do	do	do				
do	do	Sandy	8.42	29	17	
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. p sq. i
585*a*	Persea Carolinensis	Red Bay	13, 240	1, 308, 000	
585*b*	do	do	12, 690	1, 158, 000	
585*e*	do	do			8, 49
585*f*	do	do			7, 82
340*a*	Persea Carolinens, var. pubescens.	do	11, 770	1, 260, 000	
340*a*	do	do			
340	do	do			4, 64
340	do	do			5, 81
71*a*	Sassafras officinale	Sassafras	9, 330	790, 000	
71*b*	do	do	10, 150	980, 000	
71*e*	do	do			
71*e*	do	do			5, 28
71	do	do			5, 77
387*a*	do	do	5, 180	631, 000	
387*b*	do	do	8, 400	990, 000	
387*b*	do	do			
387*e*	do	do			5, 11
387*e*	do	do			5, 62
1163*e*	do	do			5, 64
1163*e*	do	do			5, 36
446*a*	do	do	9, 450	990, 000	5, 97
814*a*	do	do	8, 610	738, 000	
814*b*	do	do	9, 650	731, 000	5, 92
814*e*	do	do			
814*e*	do	do			
814	do	do			5, 71
854*a*	do	do	5, 270	496, 000	
854*b*	do	do	6, 660	462, 000	
854*e*	do	do			
854*e*	do	do			5, 20
854	do	do			4, 05
703*a*	Umbellularia Californica	Myrtle	13, 450	1, 730, 000	
703*b*	do	do	9, 670	1, 580, 000	7, 78
703*e*	do	do			8, 39
703*e*	do	do			
468*a*	Drypetes crocea	Guiana Plum	11, 410	1, 580, 000	9, 25
459*a*	do	do	8, 460	1, 283, 000	7, 34
459*b*	do	do	11, 830	1, 220, 000	
459	do	do			7, 46
324*a*	Ulmus crassifolia	Cedar Elm	11, 600	1, 158, 000	
324*b*	do	do	10, 520	1, 388, 000	
324*e*	do	do			
324*e*	do	do			
324	do	do			6, 98
324	do	do			7, 48
929*a*	do	do	11, 280	846, 000	5, 29
929*b*	do	do	10, 920	788, 000	
929	do	do			6, 03
30*a*	Ulmus fulva	Slippery Elm; Red Elm	11, 224	1, 388, 000	
30*a*	do	do			
30_3	do	do			6, 98
30_4	do	do			7, 62
369	do	do	13, 952	1, 571, 000	
120_1	do	do			8, 79
120*e*	do	do			
134*a*	do	do	13, 450	1, 395, 000	
134*b*	do	do	13, 450	1, 580, 000	
134*e*	do	do			
134*e*	do	do			7, 46
134	do	do			7, 50
429	do	do	10, 220	1, 283, 000	
19*a*	Ulmus Americana	White Elm; Water Elm	14, 170	1, 388, 000	
19*b*	do	do	15, 070	1, 360, 000	
19*e*	do	do			
19*e*	do	do			
19	do	do			7, 69
19	do	do			7, 62
1036*a*	do	do	8, 250	542, 000	
1036*b*	do	do	9, 300	694, 000	
1036*e*	do	do			

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Florida	Saint John's River	Sandy loam	7.40	45	12	
do	do	do				
do	do	do				
do	do	do				
Alabama	Mobile	Damp, sandy	14.64		119	
do	do	do				
do	do	do				
do	do	do				
Missouri	Allenton	Low, rich				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	Alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	Low, alluvial				
do	do	do				
Tennessee	Nashville	Rich				
West Virginia	Grafton					
do	do					
do	do					
do	do					
do	do					
Massachusetts	Danvers	Rich loam	9.18	68	11	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Oregon	Coos Bay					
do	do					
do	do					
do	do					
Florida	U. Metacombe Key	Coral				
do	do	do	11.50	52	112	
do	do	do				
do	do	do				
Texas	Dallas	Rich loam	19.05	76	52	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Austin	do				
do	do					
do	do					
Kentucky	Mercer					
do	do	Limestone				
do	do	do				
do	do	do				
Vermont	Charlotte					
Michigan	Dansville	Gravelly				
do	do	do				
Missouri	Allenton	do				
do	do	Rich, alluvial				
do	do	do				
do	do	do				
do	do	do				
Tennessee	Nashville	do				
Massachusetts	Brookline	Clay				
do	do	Drift	22.09	38	19	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Danvers	do				
do	do	Gravelly	6.30	17	7	
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Contin

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. sq.
1036*e*	Ulmus Americana	White Elm; Water Elm			
1036	do	do			6,
1036	do	do			4,
1049*a*	do	do	14, 490	1, 237, 000	8,
1049*b*	do	do	13, 235	1, 283, 000	
281*a*	do	do	11, 390	1, 024, 000	
281*b*	do	do	11, 560	1, 120, 000	
281*e*	do	do			6,
281*e*	do	do			6,
958*e*	do	do			
958*e*	do	do			
958	do	do	11, 660	1, 220, 000	5,
958	do	do	12, 839	1, 388, 000	4,
116*a*	Ulmus racemosa	Rock Elm; American Cork Elm.	19, 470	1, 775, 000	10,
116*a*	do	do	12, 730	1, 510, 000	6,
116*b*	do	do	15, 190	1, 872, 000	8,
116*a*	do	do	15, 710	1, 657, 000	8,
314*a*	do	do	16, 700	1, 981, 000	9,
314*b*	do	do	14, 850	1, 981, 000	9,
428*a*	do	do	12, 490	1, 068, 000	6,
133*a*	Ulmus alata	Wahoo; Feathered Elm; Winged Elm; Small-Leaved Elm.	10, 675	723, 000	6,
133*e*	do	do			6,
133*e*	do	do			
380*a*	do	do	10, 090	799, 000	5,
533*a*	do	do	11, 770	990, 000	
533*b*	do	do	12, 910	966, 000	
533*e*	do	do			6,
533*e*	do	do			7,
533*f*	do	do			
533*f*	do	do			
758*e*	Planera aquatica	Water Elm			
758*e*	do	do			
758	do	do	8, 230	1, 158, 000	5,
758	do	do	11, 770	668, 000	5,
918*a*	do	do	6, 720	579, 000	5,
75*a*	Celtis occidentalis	Sugarberry; Hackberry; False Elm.	16, 220	1, 035, 000	5,
75*b*	do	do	11, 590	1, 308, 000	6,
75*b*	do	do			
306*a*	do	do	10, 600	779, 000	
306*b*	do	do	10, 830	838, 000	
306*e*	do	do			
306*e*	do	do			
306	do	do	12, 120	926, 000	4,
306	do	do			5,
375*e*	do	do			6,
375*e*	do	do			6,
873*a*	do	do	11, 070	836, 000	
873*b*	do	do	10, 920	846, 000	
873*b*	do	do			
873	do	do			4,
873	do	do			6,
1111*a*	do	do	12, 780	1, 051, 000	7,
1111*b*	do	do	11, 770	1, 283, 000	
1111*e*	do	do			7,
1111*e*	do	do			
652*a*	Celtis occidentalis, var. reticulata.		8, 390	899, 000	6,
652*b*	do		14, 684	1, 741, 000	
486*a*	Ficus aurea	Wild Fig	4, 010	451, 000	2,
486*b*	do	do	2, 850	315, 000	
486	do	do			1,
508*a*	Ficus pedunculata		3, 280	408, 000	3,
132*a*	Morus rubra	Red Mulberry; Black Mulberry.	13, 450	1, 544, 000	7,
132*b*	do	do	12, 170	1, 446, 000	7,
1244*a*	do	do	10, 980	1, 199, 000	5,
1245*a*	do	do	10, 600	1, 340, 000	5,

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Massachusetts	Danvers	Gravelly				
do	do	do				
do	do	do				
do	North Reading	do	8.46	10	21	
do	do	do				
Missouri	Allenton	Alluvial				
do	do	do				
do	do	do				
do	do	do				
Texas	Colorado River	do	9.06	5	17	
do	do	do				
do	do	do				
do	do	do				
Michigan	Dansville	Gravelly				
do	Big Rapids	Low, gravelly				
do	do	do				
do	Hudson	Alluvial				
do	Hersey	Rich loam				
do	do	do				
Tennessee	Nashville	do				
South Carolina	Bonneau's Depot	do				
do	do	do				
do	do	do				
Kentucky	Davidson	Loam				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Chattahoochee	Rich, alluvial	9.68	0	38	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Missouri	Allenton	Low, rich				
do	do	do				
do	do	do				
Texas	Dallas	Alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Tennessee	Davidson	do				
do	do	Loam				
Massachusetts	Salem	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Missouri	Saint Louis	do				
do	do	Moist loam	5.10	0	23	
do	do	do				
do	do	do				
Arizona	Santa Rita Mountains.	Dry				
do	do					
Florida	Bay Biscayne	do				
do	do	Coral				
do	do	do				
do	Boca Chica Key	do				
Missouri	Allenton	do				
do	do	Rich loam				
	(Saw-mill)	do				
	do					

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. p sq. in
1246*a*	Morus rubra	Red Mulberry; Black Mulberry.	9,990	1,067,000	5,32
1255*a*	do	do	10,670	926,000	
1255*b*	do	do	10,030	1,035,000	
1255*c*	do	do			5,18
1255*e*	do	do			5,03
253*a*	Maclura aurantiaca	Osage Orange; Bois d'Arc	15,920	1,446,000	
253*a*	do	do			
253*b*	do	do	16,500	1,388,000	10,46
253	do	do			12,54
21*c*	Platanus occidentalis	Sycamore; Buttonwood			
21*e*	do	do			
21	do	do	6,720	630,000	6,01
21	do	do			4,96
126*a*	do	do	11,360	1,544,000	
126*b*	do	do	9,220	1,775,000	
126*c*	do	do			7,21
126*f*	do	do			7,34
686*a*	Platanus racemosa	Sycamore	8,420	879,000	
686*b*	do	do	7,700	939,000	
686*c*	do	do			
686*e*	do	do			5,22
686	do	do			3,98
648*a*	Platanus Wrightii	do	6,720	579,000	
648*b*	do	do	5,560	763,000	
648*c*	do	do			
648*e*	do	do			
648	do	do			4,98
648	do	do			4,56
16*a*	Juglans cinerea	Butternut; White Walnut	5,290	902,000	
16*b*	do	do	9,590	1,158,000	
16	do	do			5,48
16	do	do			5,66
1057	do	do	11,740	1,158,000	5,66
76*a*	do	do	9,830	1,388,000	6,83
76*b*	do	do	9,300	1,544,000	6,76
76*ca*	do	do	9,990	1,872,000	
76*a*	do	do			6,02
123*a*	do	do	8,050	994,000	5,48
398*a*	do	do	4,700	694,000	3,66
145*e*	do	do			4,52
112*a*	Juglans nigra	Black Walnut	14,760	1,741,000	
112	do	do			8,02
117*a*	do	do	10,980	1,510,000	8,83
318*a*	do	do	8,400	1,358,000	8,06
149*a*	do	do	10,430	1,571,000	6,92
430	do	do	12,880	1,416,000	
325*e*	do	do			7,42
325	do	do	9,590	1,266,000	
951*a*	do	do	13,270	1,647,000	
951*b*	do	do	13,450	1,580,000	
951*c*	do	do			
951*e*	do	do			
951	do	do			7,28
951	do	do			8,52
407*a*	do	do	13,250	1,925,000	8,88
766*e*	do	do			8,52
766*c*	do	do			8,88
766*f*	do	do			
766*f*	do	do			
766	do	do	11,760	1,730,000	
766	do	do	16,320	2,317,000	
415*a*	Juglans rupestris		13,616	990,000	5,88
415*b*	do		6,630	990,000	5,88
672*a*	do		6,720	1,308,000	
672*b*	do		7,470	1,120,000	7,38
672	do				6,48
822	Carya olivæformis	Pecan Nut	9,670	1,510,000	6,18
822*e*	do	do			7,38

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
	(Saw-mill)					
Missouri	Allenton					
do	do					
do	do					
do	do					
Texas	Dallas	Bottom land				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Brookline	Drift	26.77	3	35	
do	do	do				
do	do	do				
do	do	do				
Missouri	Allenton	Rich, alluvial				
do	do	do				
do	do	do				
do	do	do				
California	Carmel River	Clay	11.02	Total, 20		
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Arizona	Santa Rita Mountains	Rich, gravelly				Grown at 4,000 feet altitude.
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Brookline	Drift	22.05	50	5	
do	do	do				
do	do	do				
do	do	do	22.05	50	5	
do	Topsfield	do	5.98	29	8	
Missouri	Allenton	Rich loam				
do	do	do				
do	do	Alluvial				
do	do	do				
Michigan	Dansville	Gravelly clay				
do	Lansing	Gravelly loam				
Illinois	Waukegan	Alluvial				
Missouri	Allenton	do				
do	do	do				
Michigan	Dansville	Gravelly				
do	Lansing	Loam				
Illinois	Waukegan	do				
Tennessee	Nashville	Limestone				
Texas	Dallas	Alluvial				
do	do	do				
do	New Braunfels	Moist, calcareous				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	(Charlestown navy-yard.)					
do	Aspaloga	Clay				
do	do	do				
do	do	do				
do	do	do				
New Mexico	do	do				
do	do	do				
California	Pinos Altos Mountains.	Alluvial	8.15	32	15	
do	do	do				
do	Contra Costa	do	12.32	28	11	
Mississippi	do	do				
do	do	do				
	Greenville	do	10.24	48	33	
	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. per sq. in.
322$_2$	Carya olivæformis	Pecan Nut	6,560	914,000	
326*a*	do	do	8,320	747,000	
326*b*	do	do	8,610	770,000	
326*c*	do	do			
326*e*	do	do			
326	do	do			5,360
326	do	do			5,850
3*a*	Carya alba	Shellbark Hickory; Shagbark Hickory.	17,840	1,885,000	
3*b*	do	do	17,920	1,996,000	
3*c*	do	do			
3*e*	do	do			
3	do	do			8,080
3	do	do			7,380
1056*a*	do	do	16,320	1,775,000	
1056*b*	do	do	15,400	1,367,000	
1056*c*	do	do			8,020
1056*e*	do	do			7,650
1056*f*	do	do			
1056*f*	do	do			
29$_1$	do	do	18,180	1,823,000	
29$_2$	do	do			7,880
29$_3$	do	do			
152	do	do	16,220	2,317,000	9,030
1097*a*	do	do	19,110	2,317,000	8,900
1097*b*	do	do	16,800	2,170,000	
118*a*	do	do	14,870	2,170,000	
118*a*	do	do			
118$_2$*a*	do	do	15,170	2,040,000	10,160
118$_2$	do	do			10,280
249*a*	do	do	16,390	1,647,000	9,310
249*b*	do	do	16,620	1,775,000	8,830
249*c*	do	do	17,810	2,040,000	
816*a*	do	do	14,940	2,485,000	
816*b*	do	do	17,460	2,317,000	
816*c*	do	do			9,960
816*e*	do	do			9,800
531*a*	do	do	18,480	2,398,000	
531*b*	do	do	18,480	2,040,000	
531*c*	do	do	20,710	2,398,000	
531*c*	do	do			9,190
531*e*	do	do			7,900
539*a*	do	do	17,810	2,680,000	
539*b*	do	do	17,750	2,398,000	
539*c*	do	do			
539*e*	do	do			
539	do	do			9,480
539	do	do			9,350
91$_2$	Carya sulcata	do	14,650	1,657,000	
91$_2$*a*	do	do	10,830	1,199,006	
383*a*	do	do	16,100	1,360,000	
383*b*	do	do	15,130	1,153,000	
383*c*	do	do	16,650	1,835,000	
383*e*	do	do			6,940
383	do	do			7,380
391*a*	do	do	16,800	1,502,000	8,510
391*b*	do	do	16,010	1,544,000	8,630
1082*a*	do	do	15,580	1,416,000	7,440
1082*b*	do	do	15,520	1,608,000	7,100
1164*a*	do	do	19,400	2,485,000	9,420
1164*b*	do	do	18,450	2,297,000	
1164	do	do	16,410	1,647,000	
1165*e*	do	do			7,860
1165	do	do	11,210	1,730,000	
1166*e*	do	do			7,980
1166	do	do	15,550	1,544,000	
1170*e*	do	do			8,210
1170	do	do	14,620	2,297,000	
254*a*	Carya tomentosa	Mocker Nut; Big Bud Hickory.	20,250	2,579,000	10,000
289*e*	do	do			8,140

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Mississippi	Greenville	Alluvial				
Texas	Dallas	do	10.71	84	24	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do	10.71	84	24	
Massachusetts	Brookline	Drift	12.00	27	35	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Topsfield	Rich loam	9.84	Total	53	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Kentucky	Danville	Shale				
do	do	do				
do	do	do				
Missouri	Allenton	Rich upland				
do	do	Alluvial				
do	do	do				
Michigan	Hudson	Clay				
do	do	do				
do	do	do				
do	Lansing	do				
Virginia	Wytheville	do				
do	do	do				
do	do	do				
West Virginia	Grafton	Alluvial				
do	do	do				
do	do	do				
do	do	do				
Mississippi	Kemper's Mill	do	11.84	81	28	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do	14.41	102	31	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Kentucky	do	do				
do	Mercer	do				
Missouri	do	do				
do	Allentown	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. pe sq. in.
72*a*	Carya tomentosa	Mocker Nut; Big Bud Hickory.	13, 190	1, 416, 000	
72*b*	do	do	14, 980	1, 741, 000	
72*c*	do	do			7, 700
72*c*	do	do			7, 980
348*a*	do	do	16, 440	1, 571, 000	
348	do	do			8, 330
6*a*	Carya porcina	Pig Nut	15, 130	1, 544, 000	
6*b*	do	do	15, 130	1, 657, 000	
6*c*	do	do			
6*c*	do	do			
6	do	do			7, 260
6	do	do			8, 080
1051*a*	do	do	15, 920	1, 741, 000	
1051	do	do	16, 700	1, 730, 000	8, 470
88*a*	do	do	19, 430	2, 241, 000	
88*b*	do	do	16, 800	1, 823, 000	
88*c*	do	do			9, 740
88*c*	do	do			8, 790
288*a*	do	do	16, 440	1, 741, 000	7, 780
1098*a*	do	do	12, 830	1, 072, 000	
1098*b*	do	do	12, 420	1, 120, 000	
1168*a*	do	do	13, 080	1, 102, 000	7, 460
1168*b*	do	do	15, 130	1, 168, 000	7, 460
1211*a*	do	do	12, 580	1, 981, 000	8, 100
442*a*	do	do	11, 560	1, 266, 000	7, 860
538*a*	do	do	13, 330	1, 618, 000	
538*b*	do	do	15, 930	1, 981, 000	
538*c*	do	do	15, 680	2, 040, 000	8, 270
153*c*	Carya amara	Bitter Nut; Swamp Hickory; White Hickory.			
153*c*	do	do			
153	do	do	16, 220	1, 618, 000	7, 360
153	do	do			8, 100
338*a*	do	do	13, 420	1, 242, 000	
338*b*	do	do	16, 120	1, 787, 000	
338*c*	do	do	17, 410	1, 668, 000	
338*c*	do	do			
338	do	do			7, 780
338	do	do			7, 100
287*a*	Carya myristicæformis	Nutmeg Hickory	18, 570	1, 981, 000	9, 920
237*b*	do	do	21, 420	2, 579, 000	8, 230
129*a*	Carya aquatica	Water Hickory; Bitter Pecan Nut.	15, 250	1, 823, 000	
129	do	do			7, 500
362*a*	do	do	13, 220	1, 068, 000	
362*b*	do	do	13, 450	1, 308, 000	
362*c*	do	do	15, 770	1, 388, 000	
362*c*	do	do			
362	do	do			6, 470
362	do	do			6, 610
740*a*	do	do	11, 280	1, 741, 000	
740*a*	do	do			
740*b*	do	do	17, 720	2, 153, 000	
740	do	do	6, 720	1, 388, 000	8, 190
740	do	do			7, 020
917*c*	do	do			
917*c*	do	do			
917	do	do	8, 050	1, 380, 000	5, 790
917	do	do			6, 810
586*a*	Myrica cerifera	Wax Myrtle	11, 710	1, 388, 000	6, 330
665*a*	Myrica Californica		15, 130	1, 510, 000	
665*b*	do	do	14, 580	1, 478, 000	7, 160
665	do	do			8, 040
8*b*	Quercus alba	White Oak	11, 220	1, 098, 000	
8*c*	do	do	12, 170	1, 510, 000	
8*c*	do	do			
8*c*	do	do			
8	do	do			4, 980
8	do	do			4, 760
32*a*	do	do	14, 760	1, 608, 000	8, 140

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Kentucky	Perryville	Utica shale				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Alabama	Citronelle	Sandy				
....do	do	....do				
Massachusetts	Brookline	Drift	12.48	54	29	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	North Reading		8.98	42	31	
....do	....do					
Missouri	Allenton	Rich loam	6.26	6	41	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do		13	47	
....do	....do	Flinty				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Michigan	Dansville	Clay, gravelly				
Tennessee	Nashville	Upland				
Alabama	Kemper's Mill	Alluvial	13.94	59	63	
....do	....do	....do				
....do	....do	....do				
Missouri	Allenton	Rich upland				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Massachusetts	Danvers	Rich loam				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
South Carolina	Bonneau's Depot	Rich, swampy	15.83	107	7	
....do	....do	....do				
....do	....do	Swampy				
....do	....do	....do				
Mississippi	Vicksburg					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Georgia	Bainbridge	Alluvial	9.06	7	27	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Florida	Chattahoochee	....do	10.31	28	23	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	Saint John's River	Sandy loam	7.80	22	18	
California	Santa Cruz					
....do	....do					
....do	....do					
Massachusetts	Brookline					
....do	....do	Drift	22.05	88	12	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do	22.05	88	12	
Kentucky	Mercer	Limestone				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. per sq. in.
32_2a	Quercus alba	White Oak	13,080	1,544,000	7,180
32_2a	do	do	11,740	1,416,000	6,920
49a	do	do	14,700	1,544,000	8,140
49b	do	do	11,740	1,085,000	6,850
49^1a	do	do	13,450	1,416,000	7,500
49_2a	do	do	11,660	1,158,000	6,960
49_2a	do	do	13,240	1,360,000	7,380
113a	do	do	9,850	1,020,000	6,090
113_2a	do	do	9,880	1,416,000	7,500
113_2b	do	do	8,390	1,005,000	6,490
113_2	do	do	14,030	1,388,000	
238a	do	do	15,130	1,939,000	8,910
238b	do	do	15,130	1,730,000	8,550
250a	do	do	15,036	1,823,000	9,070
250b	do	do	13,330	1,925,000	
250b	do	do			
250	do	do			8,790
251a	do	do	10,950	1,237,000	
251b	do	do	15,170	1,823,000	
251c	do	do			6,730
251c	do	do			6,170
259_1a	do	do	14,940	1,388,000	8,650
259_2a	do	do	12,120	1,388,000	7,500
403a	do	do	10,370	1,388,000	
403b	do	do	9,380	1,215,000	
403c	do	do			
403c	do	do			
403	do	do			7,820
403	do	do			8,040
443a	do	do	7,010	879,000	5,810
547c	do	do			
547c	do	do			
547	do	do	18,360	2,103,000	7,900
547	do	do	14,790	1,478,000	8,470
748a	do	do	16,130	1,822,000	
748b	do	do	16,540	1,835,000	
748c	do	do			7,700
748f	do	do			
749a	do	do	14,940	1,139,000	
749b	do	do	10,750	1,068,000	
749c	do	do			
749c	do	do			
749	do	do			7,210
749	do	do			6,980
895a	do	do	10,080	1,333,000	
895b	do	do	10,080	1,068,000	
895c	do	do			
895c	do	do			5,690
895f	do	do			6,770
1050a	do	do	16,610	1,823,000	
1050b	do	do	14,940	1,020,000	
1050c	do	do			
1050c	do	do			
1050	do	do			6,650
1050	do	do			6,490
1257a	do	do	14,410	1,835,000	
1257b	do	do	13,190	1,580,000	
1257c	do	do			8,430
1257f	do	do			7,480
670a	Quercus lobata	do	12,580	923,000	
670a	do	do			5,810
670b	do	do	12,230	1,102,000	
670	do	do			6,270
985a	Quercus Garryana	do	15,020	1,242,000	7,340
985b	do	do	13,540	1,237,000	7,020
988a	do	do	13,190	1,178,000	
988b	do	do	14,670	1,288,000	
988c	do	do			6,990
988c	do	do			6,600
1027a	do	do	11,773	1,395,000	7,540

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Kentucky	Boyle	Slate				
do	do	Shale				
Missouri	Allenton	Rich upland				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Michigan	Big Rapids	Gravelly				
do	Dansville	Sandy				
do	do	do				
do	Hudson					
South Carolina	Bonneau's Depot	Rich, damp loam				
do	do	do				
Virginia	Wytheville	Clay				
do	do	do				
do	do	do				
do	do	do				
do	do		8.86	Total 56		
do	do					
do	do					
do	do					
do	do					
do	do	Gravelly				
do	do	do				
Maryland	(Charlestown navy-yard.)					
do	do					
do	do					
do	do					
do	do					
do	do					
Tennessee	Nashville					
Alabama	Kemper's Mill	Rich bottom				
do	do	Alluvial	8.27	31	12	
do	do	do				
do	do	do				
Florida	Chattahoochee	do				
do	do	Clay	9.29	43	8	Brash, rough bark.
do	do	do				Do.
do	do	do				Do.
do	do	do				Do.
do	do	do	9.76	74	13	Tough, smooth bark.
do	do	do				Do.
do	do	do	9.76	74	13	Do.
do	do	do				Do.
do	do	do				Do.
do	do	do				Do.
Massachusetts						Cut in the year 1757.
do						Do.
do						Do.
do						Do.
do						Do.
do	North Reading		7.99	11	7	Do.
do	do					
do	do					
do	do					
do	do					
do	do					
California	Redding					
do	do	Gravelly loam	14.02	17	15	
do	do	do				
do	do	do				
Oregon	(Weidler's saw-mill)	do				
do	do					
do	Portland	Rich loam	15.47	82	30	
do	do	do				
do	do	do				
do	Portland (Furniture Company).	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continu

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel to grain.
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. pe sq. in.
1027*b*	Quercus Garryana	White Oak	10,080	1,068,000	
1027*b*	do	do			
1027	do	do			6,68
1029*a*	do	do	13,200	1,395,000	7,78
1029*b*	do	do	9,450	994,000	6,69
37*c*	Quercus obtusiloba	Post Oak			
37*c*	do	do			
37$_1$	do	do			6,63
37$_2$	do	do	15,130	1,051,000	
37$_3$	do	do			5,81
151*a*	do	do	14,430	1,360,000	7,82
151*b*	do	do	15,030	1,510,000	8,89
256*a*	do	do	13,080	1,139,000	
351*a*	do	do	9,730	926,000	
351*b*	do	do	12,810	1,544,000	
351*c*	do	do			
351*c*	do	do			
351	do	do			5,40
351	do	do			5,69
771*a*	do	do	11,590	1,395,000	
771*b*	do	do	8,360	1,158,000	
771*c*	do	do			
771*c*	do	do			
771	do	do			7,66
771	do	do			7,00
417*a*	Quercus undulata, var. Gambelli.	White Oak	11,770	868,000	
417*b*	do	do	14,330	980,000	7,08
417*c*	do	do			6,61
525*a*	do	do	4,650	631,000	
525*a*	do	do			4,07
525*b*	do	do	8,300	772,000	5,95
79*a*	Quercus macrocarpa	Burr Oak	15,130	1,730,000	7,46
79*a*	do	do	15,680	1,775,000	7,22
137*c*	do	do			7,78
137	do	do	17,570	1,476,000	
143	do	do	9,990	962,000	6,20
310*a*	do	do	13,880	1,478,000	
310*b*	do	do	13,170	1,416,000	
310*c*	do	do			7,65
310*c*	do	do			7,74
482*a*	do	do	13,300	1,266,000	6,43
831*a*	do	do	15,130	1,823,000	7,84
933*a*	do	do	18,110	1,068,000	
933*b*	do	do	11,530	994,000	
933*c*	do	do			
933*c*	do	do			
933	do	do			6,27
933	do	do			5,88
1071	do	do	15,100	1,215,000	7,10
1072*a*	do	do	14,760	1,314,000	
1072	do	do			6,51
1073	do	do	14,820	1,242,000	7,06
424*c*	Quercus lyrata	Over-cup Oak; Water White Oak.			
424*c*	do	do			
424	do	do			4,90
424	do	do			6,49
545*a*	do	do	14,940	1,885,000	
545*b*	do	do	12,430	1,580,000	
545*c*	do	do	16,440	1,730,000	
545*c*	do	do			7,58
545*f*	do	do			7,78
762*a*	do	do	14,640	2,103,000	
762*b*	do	do	15,130	1,925,000	
762*c*	do	do			
762*c*	do	do			
762	do	do			6,89
762	do	do			8,31
12*c*	Quercus bicolor	Swamp White Oak			

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Oregon	Portland (Furniture Company).					
do	do					
do	do					
do	do					
do	do					
Kentucky	Harrodsburg	Shale				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
South Carolina	Bonneau's Depot	Rich upland				
do	do	do				
do	do	do				
Alabama	Citronelle	Clay	9.61	88	38	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Aspaloga	Gravelly barrens	10.39	115	32	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
New Mexico	Pinos Altos Mountains.					
do	do					
do	do					
Colorado	Engelmann's Cañon	Rocky				
do	do	do				
do	do	do				
Kentucky	Mercer	Alluvial				
do	do	do				
Missouri	Allenton	Moist upland				Second growth.
do	do	do				Do.
Illinois	Waukegan	Rich				
Texas	Dallas	Rich, moist	20.78	120	13	
do	do	do				
do	do	do				
do	do	do				
Tennessee	Nashville	Alluvial				
Illinois	Winnebago	Loam				From fence post 6 years in ground.
Texas	Austin	Alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Vermont	Charlotte					
do	do					
do	do					
do	do					
Tennessee	Nashville	Low, stiff		Total 180		
do	do	do				
do	do	do				
do	do	do				
Mississippi	Kemper's Mill	Alluvial	13.35	73	19	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Chattahoochee	do	10.47	70	20	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Brookline	Drift	12.00	60	8	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Co

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
12s	Quercus biocolo	Swamp White Oak		
12	do	do		
12	do	do		
54a	do	do	15, 860	1, 308, 000
54a	do	do		
54b	do	do	14, 330	1, 741, 000
54a	do	do	13, 450	1, 741, 000
54a	do	do	14, 850	1, 775, 000
54	do	do		
846a	do	do	8, 360	923, 000
846b	do	do	11, 370	1, 051, 000
846	do	do		
846	do	do		
755a	Quercus Michauxii	Basket Oak; Cow Oak	16, 530	1, 237, 000
755b	do	do	16, 160	1, 178, 000
755c	do	do		
755c	do	do		
755	do	do		
524a	do	do	16, 010	1, 266, 000
524b	do	do	16, 410	1, 608, 000
524c	do	do		
524c	do	do		
524	do	do		
240a	do	do	15, 250	1, 544, 000
240b	do	do	15, 780	1, 308, 000
240	do	do		
240	do	do		
31a	Quercus prinus	Chestnut Oak	17, 470	1, 823, 000
31a	do	do	13, 340	1, 823, 000
35a	do	do	18, 730	2, 485, 000
434a	do	do	7, 850	868, 000
434	do	do		
925a	do	do	16, 190	2, 317, 000
925b	do	do	15, 070	1, 730, 000
925	do	do		
34a	Quercus prinoides	Chinquapin Oak; Yellow Oak	16, 440	1, 388, 000
24a	do	do	20, 890	2, 241, 000
278a	do	do	18, 530	1, 618, 000
287a	do	do	18, 330	1, 730, 000
514a	do	do	18, 480	1, 780, 000
514b	do	do	16, 090	1, 657, 000
514	do	do		
514	do	do		
323a	do	do	17, 660	1, 478, 000
323b	do	do	15, 630	1, 478, 000
323	do	do		
688a	Quercus Douglasii	Mountain White Oak; Blue Oak.	15, 020	1, 367, 000
688a	do	do		
688b	do	do	13, 450	902, 000
688	do	do		
688	do	do		
655a	Quercus oblongifolia	Evergreen White Oak; Live Oak.	13, 880	994, 000
655b	do	do	6, 720	1, 446, 000
655	do	do		
655	do	do		
698a	Quercus grisea	White Oak	13, 450	1, 085, 000
1103a	Quercus Durandii	White Oak; Basket Oak	14, 330	1, 266, 000
1103b	do	do	14, 150	1, 102, 000
1103c	do	do		
1103c	do	do		
1103	do	do		
404a	Quercus virens	Live Oak	15, 130	2, 241, 000
799a	do	do	18, 980	2, 170, 000
799b	do	do	17, 380	1, 823, 000
799	do	do		
799	do	do		
919a	do	do	14, 490	1, 553, 000

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Massachusetts	Brookline	Drift				
do	do	do				
do	do	do				
Missouri	Allenton	Alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	West Newbury	Low, swampy				
do	do	do				
do	do	do				
do	do	do				
Florida	Chattahoochee	Alluvial	10.24	32	12	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Alabama	Kemper's Mill	do	12.68	69	22	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
South Carolina	Bonneau's Depot	do				
do	do	do				
do	do	do				
do	do	do				
Kentucky	Boyle Company	Shale				
do	do	do				
do	do	Limestone				
do	Nashville	Rocky upland				
Tennessee	do	do				
do	Cullman	Dry, rocky	17.16	84	34	
Alabama	do	do				
do	do	do				
Kentucky	Mercer	Limestone				
do	do	do				
do	Allenton	do				
Missouri	do	Flinty				
do	Nashville	Alluvial				
Tennessee	do	do				
do	do	do				
do	do	do				
Texas	Dallas	Calcareous	8.90	31	25	
do	do	do				
do	do	do				
California	Contra Costa	Clay	13.31	Total 59		
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	San Diego	Dry, gravelly				
do	do	do				
do	do	do				
do	do	do				
Arizona	Santa Rita Mountains.	Dry, rocky				
Texas	Austin	Damp, calcareous				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
(Charlestown navy-yard.)						
Florida	Saint John's River	Sandy	9.37	15	39	
do	do	do				
do	do	do				
do	do	do				
Alabama	Mobile	Rich, sandy				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Cont

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
919b	Quercus virens	Live Oak	15,130	1,536,000
954a	do	do	12,050	1,120,000
954b	do	do	9,300	1,068,000
954b	do	do		
954	do	do		
954	do	do		
649a	Quercus chrysolipis	California Live Oak	18,770	1,741,000
649b	do	do	18,180	1,823,000
653a	do	do	18,420	1,730,000
653b	do	do	17,380	1,996,000
653c	do	do		
653c	do	do		
653	do	do		
653	do	do		
654a	Quercus Emoryi	do	10,080	902,000
663a	Quercus agrifolia	do	13,450	1,237,000
663b	do	do	13,340	1,308,000
685a	Quercus Wislizeni	do	10,900	1,139,000
685b	do	do	12,580	1,260,000
685c	do	do		
685c	do	do		
685	do	do		
685	do	do		
7a	Quercus rubra	Red Oak	18,370	1,981,000
7b	do	do	16,800	2,656,000
7c	do	do	15,020	1,647,000
7d	do	do	15,170	1,835,000
7e	do	do		
7e	do	do		
45$_1$a	do	do	12,270	1,446,000
45$_2$a	do	do	12,960	1,478,000
45$_2$b	do	do	11,280	1,194,000
89c	do	do		
89c	do	do		
89	do	do		
89	do	do		
92a	do	do	11,280	1,158,000
140a	do	do	13,190	1,823,000
141a	do	do	11,210	1,102,000
146	do	do	12,840	1,730,000
215a	do	do	15,170	1,939,000
215b	do	do	12,580	1,544,000
215c	do	do		
215c	do	do		
217c	do	do		
217c	do	do		
217	do	do	15,370	1,286,000
218a	do	do	17,810	1,981,000
218b	do	do	16,800	1,872,000
218c	do	do		
920a	do	do	9,760	1,102,000
920b	do	do	10,920	1,242,000
920c	do	do		
920c	do	do		
920f	do	do		
920f	do	do		
1043a	do	do	18,370	2,040,000
1043b	do	do	16,800	1,981,000
1043	do	do		
1043	do	do		
931a	Quercus rubra, var. Texana		17,960	1,580,000
931b	do		11,410	1,478,000
752a	Quercus coccinea	Scarlet Oak	15,130	1,741,000
752	do	do		
17a	Quercus tinctoria	Black Oak; Quercitron Oak	16,500	1,730,000
17b	do	do	15,130	1,730,000
17c	do	do		
17c	do	do		
17f	do	do		

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Alabama	Mobile	Rich, sandy				
Texas	Matagorda Bay	Sandy loam				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
California	San Bernardino					
do	do					
do	Marin	Gravelly				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Arizona	Santa Rita Mountains.	Dry, rocky				
California	Marin	Loam	9.72			
do	do	do				
do	Auburn	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Brookline	Drift	21.02	73	8	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Mercer	Shale				
Kentucky	do	do				
do	do	do				
do	Allenton	Rich loam	5.71	40	5	
Missouri	do	do				
do	do	do				
do	do	do				
do	Mercer	Alluvial				
Kentucky	Dansville	Sandy				
Michigan	do	do				
do	Waukegan	Gravelly				
Illinois	Charlotte	do				
Vermont	do	do				
do	do	do				
do	do	do				
do	do	do				Second growth from stump.
do	do	do				Do.
do	do	do				Do.
do	do	do				
do	do	do				
do	do	do				
do	Enterprise	Alluvial	14.33	123	10	
Mississippi	do	do	14.33	123	10	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	North Reading	Drift	9.05	27	6	
do	do	do				
do	do	do				
do	do	do				
Texas	Austin	Calcareous	4.65	20	13	
do	do	do				
Florida	Aspalaga	Clay				
do	do	do				
Massachusetts	Brookline	Drift	24.80	74	8	
do	do	do				
do	do	do				
do	do	do				
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Co

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
17f	Quercus tinctoria	Black Oak; Quercitron Oak.		
36a	do	do	14, 940	1, 544, 000
36a	do	do	18, 220	1, 730, 000
36a	do	do	13, 690	1, 068, 000
74a	do	do	16, 930	1, 340, 000
74b	do	do	13, 340	1, 158, 000
86a	do	do	16, 070	1, 395, 000
244a	do	do	11, 410	1, 134, 000
244b	do	do	7, 900	790, 000
247a	do	do	18, 420	2, 103, 000
247b	do	do	18, 080	2, 103, 000
247b	do	do		
247	do	do		
437a	do	do	13, 450	1, 608, 000
628a	Quercus Kelloggii	Black Oak	12, 470	1, 260, 000
628b	do	do	12, 120	1, 388, 000
963a	do	do	9, 510	911, 000
963b	do	do	10, 030	846, 000
963	do	do		
268a	Quercus nigra	Black Jack	14, 940	1, 388, 000
339	do	do		
131a	Quercus falcata	Spanish Oak; Red Oak	16, 800	1, 835, 000
131b	do	do	16, 900	2, 103, 000
245a	do	do	14, 940	1, 730, 000
245b	do	do	16, 800	2, 103, 000
245c	do	do		
245e	do	do		
265a	do	do	19, 140	2, 103, 000
265a	do	do	16, 800	1, 736, 000
548a	do	do	18, 150	2, 398, 000
548a	do	do		
548b	do	do	18, 910	2, 170, 000
548	do	do		
342a	Quercus Catesbæi	Turkey Oak; Scrub Oak	14, 210	1, 446, 000
342b	do	do	14, 710	1, 580, 000
342c	do	do		
342e	do	do		
342	do	do		
342	do	do		
770a	do	do	15, 980	1, 478, 000
770b	do	do	15, 130	1, 536, 000
770c	do	do		
770e	do	do		
770	do	do		
770	do	do		
47a	Quercus palustris	Pin Oak; Swamp Spanish Oak.	17, 690	2, 040, 000
47	do	do		
282a	do	do	15, 180	1, 416, 000
282b	do	do	14, 100	1, 314, 000
349a	Quercus aquatica	Water Oak	16, 570	2, 040, 000
349b	do	do	16, 090	1, 925, 000
349c	do	do		
349e	do	do		
349	do	do		
349	do	do		
264₁a	do	do	14, 180	1, 647, 000
264₂a	do	do	15, 100	1, 775, 000
264₃a	do	do	13, 390	1, 608, 000
511a	do	do	13, 190	1, 544, 000
511b	do	do	16, 770	2, 103, 000
511c	do	do		
511e	do	do		
511	do	do		
511	do	do		
742a	do	do	11, 560	1, 925, 000
742a	do	do		
742b	do	do	19, 140	1, 939, 000
742b	do	do		
756a	Quercus laurifolia	Laurel Oak	15, 130	1, 608, 000
756a	do	do		

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Massachusetts	Brookline	Drift				
Kentucky	Danville Junction	Shale				
do	do	do				
do	do	Slate				
Missouri	Allenton	Rich upland	6.50	14	5	
do	do	do				
do	do	do				
Virginia	Wytheville	Clay				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Tennessee	Nashville					
Oregon	Ashland (saw-mill)					
do	do					
do	Eugene City		8.82	78	17	
do	do					
do	do					
Missouri	Allenton	Clay				
Alabama	Citronelle	Sandy	5.04	46	13	
South Carolina	Bonneau's Depot	Rich loam				
do	do	do				
Virginia	Wytheville	Clay				
do	do	do				
do	do	do				
do	do	do				
do	Carroll	do				
do	do	do				
Mississippi	Kemper's Mill	Rich loam				
do	do	do				
do	do	do				
do	do	do				
Alabama	Cottage Hill	Barren, sandy				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Aspalaga	do	11.85	0	62	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Missouri	Allenton	Rich alluvial				
do	do	do				
do	do	do				Second growth.
do	do	do				Do.
Alabama	Cottage Hill	Sandy loam	13.78	16	9	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Virginia						
do						
do						
Tennessee	Tullahoma	Sandy loam				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Georgia	Bainbridge	Alluvial	12.20	23	13	
do	do	do				
do	do	do				
do	do	do				
Florida	Saint James River	Sandy loam				
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Co

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
756*b*	Quercus laurifolia	Laurel Oak	15, 920	1, 618, 000
756	do	do		
756	do	do		
801*a*	do	do	18, 480	1, 835, 000
801*b*	do	do	18, 150	2, 040, 000
801*c*	do	do		
801*c*	do	do		
801	do	do		
801	do	do		
1171*a*	Quercus heterophylla	Bartram Oak	16, 700	1, 935, 000
1171*b*	do	do	13, 570	1, 510, 000
1171*c*	do	do	15, 950	1, 823, 000
1171*c*	do	do		
1171*c*	do	do		
352*a*	Quercus cinerea	Blue Jack	14, 240	1, 158, 000
674*a*	Quercus hypoleuca		16, 090	1, 478, 000
674*a*	do			
674*b*	do		15, 860	1, 289, 000
674	do			
40	Quercus imbricaria	Shingle Oak; Laurel Oak	16, 540	1, 478, 000
40$_1$	do	do		
40$_2$	do	do		
40*a*$_2$	do	do		
40*a*$_2$	do	do		
50*a*	do	do	18, 420	1, 939, 000
50	do	do		
185	do	do		
512*a*	Quercus Phellos	Willow Oak	13, 240	1, 158, 000
512*b*	do	do	15, 130	1, 158, 000
512*c*	do	do		
512*c*	do	do		
512	do	do		
512	do	do		
687*a*	Quercus densifolia	Chestnut Oak	12, 120	1, 153, 000
687*b*	do	do	15, 020	1, 741, 000
687	do	do		
729*a*	Castanopsis chrysophylla	Chinquapin Chestnut	12, 120	1, 446, 000
729*b*	do	do	9, 120	1, 446, 000
729	do	do		
729	do	do		
573*a*	Castanea pumila	Chinquapin	14, 820	1, 657, 000
573*b*	do	do	13, 600	1, 510, 000
18*a*	Castanea vulgaris, var. Americana.	Chestnut	5, 950	708, 000
18*b*	do	do	10, 090	1, 220, 000
18*c*	do	do	8, 860	887, 000
18*c*	do	do		
18*c*	do	do		
18	do	do		
258$_1$	do	do		
258$_2$*a*	do	do	12, 870	1, 571, 000
258$_2$*a*	do	do	12, 440	1, 416, 000
258$_2$	do	do		
516*a*	do	do	9, 680	1, 283, 000
9*a*	Fagus ferruginea	Beech	18, 840	1, 981, 000
9*b*	do	do	17, 700	1, 730, 000
9*b*	do	do		
9*c*	do	do		
9*c*	do	do		
44*a*$_2$	do	do	14, 730	1, 446, 000
44*a*$_2$	do	do	13, 450	1, 730, 000
119*a*	do	do	18, 420	1, 981, 000
119*b*	do	do	16, 930	1, 981, 000
765*a*	do	do	14, 680	1, 478, 000
765*b*	do	do	15, 020	1, 571, 000
765*c*	do	do		
765*c*	do	do		
765	do	do		
765	do	do		
853*a*	do	do	15, 860	1, 730 000

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Florida	Saint James River	Sandy loam				
do	do	do				
do	do	do	9.45	26	33	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
New Jersey	Mount Holly	Clay	12.94			
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Alabama	Citronelle	Pine barren				
Arizona	Santa Rita Mountains.	Dry, rocky				
do	do	do				
do	do	do				
do	do	do				
Kentucky	Harrodsburg	Utica slate				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Missouri	Allen on	Rich, moist				
do	do	do				
do	do	Rich loam				Second growth.
Tennessee	Tullahoma	Moist, siliceous	7.24		15	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
California	Marin	Gravelly	15.74	85	25	
do	do	do				
do	do	do				
do	Mendocino					
do	do					
do	do					
do	do					
Arkansas	Hot Springs	Sandy loam				
do	do	do				
Massachusetts	Brookline	Drift	26.22	42	34	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Virginia	Fancy Gap	Moist				
do	do	do				
do	do	do				
do	do	do				
Tennessee	Nashville	Sandy				
Massachusetts	Brookline	Drift	7.48	26	9	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Kentucky	Mercer	Hudson River shale				
do	do	do				
Michigan	Danville	Gravelly				
do	do	do				
Florida	Chattahoochee	do	10.71	0	82	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Hamilton	do				
				Total 21		

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Con

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
853b	Fagus ferruginea	Beech	17,510	1,741,000
853c	do	do	18,020	1,981,000
853e	do	do		
853e	do	do		
853	do	do		
853	do	do		
11a	Ostrya Virginica	Hop Hornbeam	20,750	2,317,000
11a	do	do		
11b	do	do	18,480	2,241,000
11	do	do		
877a	do	do	11,770	1,981,000
877b	do	do	14,120	2,103,000
877b	do	do		
877	do	do		
877	do	do		
1047a	do	do	17,350	1,730,000
1047b	do	do	15,170	1,730,000
1047e	do	do		
1047	do	do		
46a	Caprinus Caroliniana	Blue Beech; Hornbeam	16,250	1,416,000
73a	do	do	19,460	1,925,000
73b	do	do	20,170	2,178,000
73e	do	do		
73e	do	do		
73i	do	do	16,800	1,981,000
73a	do	do	15,130	1,416,000
1038a	do	do	11,070	1,416,000
10a	Betula alba, var. populifolia	White Birch; Gray Birch	13,050	1,158,000
10b	do	do	8,420	779,000
848a	do	do	12,000	1,237,000
223	Betula papyracea	Canoe Birch; Paper Birch		
223	do	do		
836e	do	do		
836e	do	do		
836	do	do	16,930	2,040,000
836	do	do		
722a	do	do	15,520	1,688,000
722b	do	do	14,460	1,536,000
990a	do	do	11,710	1,618,000
990b	do	do	14,243	1,647,000
990	do	do		
990	do	do		
1065a	do	do	16,700	2,103,000
1065b	do	do	15,780	2,170,000
1065c	do	do	17,610	2,398,000
1065e	do	do		
1065e	do	do		
1066a	do	do	15,320	1,872,000
1066b	do	do	14,610	1,939,000
1066e	do	do		
1066f	do	do		
1067a	do	do	16,290	1,939,000
1067b	do	do	14,240	1,835,000
1067e	do	do		
1067e	do	do		
1067	do	do		
528a	Betula occidentalis		10,600	1,220,000
629a	do		12,530	1,388,000
629	do			
843a	Betula lutea	Yellow Birch	17,230	2,103,000
843b	do	do	18,500	2,103,000
843e	do	do		
843e	do	do		
843	do	do		
843	do	do		
1068a	do	do	17,460	2,317,000
1068b	do	do	17,480	2,317,000
1068e	do	do		
1068e	do	do		
1068	do	do		
1068	do	do		

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Massachusetts	Hamilton	Gravelly				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Brookline	Drift	11.22	44	26	
do	do	do				
do	do	do				
do	do	do				
do	Danvers	Rich loam		Tot al	45	
do	do	do				
do	do	do				
do	do	do				
do	do	do		Tot al	45	
do	North Reading		7.48	14	62	
do	do					
do	do					
do	do					
Missouri	Allenton	Damp, alluvial				
Kentucky	Mercer	Trenton limestone				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Danvers	Gravelly		Tot al	50	
do	Brookline	Drift	6.69	26	10	
do	do	do				
do	Danvers	Gravelly	7.72	33	16	
do	Charlotte	do				
Vermont	do	do				
do	[illegible]					
Ma[illegible]	do					
do	do					
do	do					
do	do					
Montana	Missoula	Wet				
do	do	do				
Alaska	Chilcoot Inlet		7.40	0	57	
do	do					
do	do					
do	do					
Vermont	Charlotte					
do	do					
do	do					
do	do

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Cont

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
1069a	Betula lutea	Yellow Birch	18,940	2,579,000
1069b	do	do	17,380	1,823,000
1069c	do	do		
1069d	do	do		
1069f	do	do		
1069f	do	do		
1070a	do	do	16,320	2,317,000
1070b	do	do	18,370	2,297,000
1070c	do	do		
1070e	do	do		
1070	do	do		
1070	do	do		
136a	Betula nigra	Red Birch; River Birch	14,910	1,618,000
136b	do	do	14,000	1,730,000
136c	do	do		
136e	do	do		
841a	do	do	13,690	1,618,000
841b	do	do	14,410	2,170,000
841	do	do		
841	do	do		
842a	do	do	13,450	1,266,000
842b	do	do	13,270	1,446,000
842c	do	do		
842e	do	do		
842	do	do		
4a	Betula lenta	Cherry Birch; Black Birch	18,480	2,103,000
4b	do	do	18,370	2,170,000
4c	do	do		
4e	do	do		
4	do	do		
221c	do	do		
221e	do	do		
221	do	do	18,570	1,787,000
844a	do	do	14,940	2,040,000
844b	do	do	16,700	2,040,000
844c	do	do		
844e	do	do		
844	do	do		
844	do	do		
810	Alnus maritima	Seaside Alder		
967a	Alnus rubra		10,060	1,544,000
967b	do		10,080	1,446,000
967c	do			
967	do			
991a	do		11,890	1,333,000
991b	do		11,760	1,102,000
991c	do			
991e	do			
1025a	do		12,910	1,787,000
1025b	do		12,990	2,103,000
717a	Alnus rhombifolia		8,140	936,000
717b	do		10,060	1,102,000
717b	do			
717	do			
717	do			
979a	do		10,030	1,416,000
979b	do		10,080	1,340,000
979c	do			
979	do			
635a	do		10,600	1,416,000
694a	Alnus oblongifolia		9,990	1,020,000
694b	do		9,730	1,120,000
694b	do			
694	do			
694	do			
374	Alnus incana	Speckled Alder		
862	do	do	11,770	1,446,000
232c	Salix nigra	Black Willow		
855a	do	do	6,070	579,000

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Vermont	Charlotte	Gravelly				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Missouri	Allenton	Moist loam				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	North Andover	Alluvial			9	From butt.
do	do	do				Do.
do	do	do				Do.
do	do	do				Do.
do	do	do	8.43	8	32	From top of trunk, sap.
do	do	do				From top of trunk.
do	do	do				Do.
do	do	do				Do.
do	do	do				Do.
do	Brookline	Drift	14.25	51	12	
do	do	do				
do	do	do				
do	do	do	14.25	51	12	
do	do	do				
do	Charlotte	Gravelly				
Vermont	do	do				
do	do	do				
do	Danvers	do	4.65	22	41	
Massachusetts	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Pepper's Mill	Sandy loam				
Delaware	Sitka					
Alaska	do					
do	do					
do	do					
do	do					
Washington Territory.	Puyallup					
do	do					
do	do					
do	do					
Oregon	Portland (Furniture Company).					
do	do					
do	Missoula	Wet				
Montana	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Oregon	Drain	Moist loam				
do	do	do				
do	do	do				
do	do	do				
do	Ashland County					
California	San Bernardino					
do	do					
do	do					
do	do					
do	do					
Vermont	Hinesburg	Wet loam				
Massachusetts	Danvers	do				
Vermont	Shelburn	Wet, sandy				
Massachusetts	Topsfield	Alluvial	7.95	50	12	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Cont

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. sq
908a	Salix amygdaloides		7,320	631,000	
908b	do		7,590	662,000	
908c	do				3
908e	do				3
911a	do		8,750	680,000	
911e	do				
911e	do				
911	do				4
911	do				3
690a	Salix lævigata		10,520	710,000	4
690b	do		7,930	668,000	
690	do				4
640a	Salix lasiandra, var. lanci folia.		8,390	723,000	3
981a	do		10,080	1,446,000	
981b	do		10,640	1,544,000	5
981	do				5
889a	Salix lasiandra, var. Fend leriana.		6,720	403,000	4
721a	Salix flavescens		11,590	1,388,000	5
721e	do				5
972a	Salix flavescens, var. Scou leriana.		13,330	2,040,000	7
972b	do		12,730	1,536,000	6
966e	Salix Hookeriana				6
966c	do				5
669a	Salix lasiolepis		11,660	1,220,000	5
1177a	Salix petriolaris		8,260	868,000	
1177b	do		10,060	1,395,000	
1177e	do				3
1177b	do				3
272a	Populus tremuloides	Aspen; Quaking Asp	8,050	1,178,000	
272b	do	do	7,780	923,000	
272b	do	do			3
272	do	do			4
272	do	do			4
1035a	do	do	10,310	1,220,000	5
1035b	do	do	12,640	1,340,000	5
847a	Populus grandidentata	Poplar	9,990	1,446,000	
847b	do	do	10,730	1,367,000	
847e	do	do			
847e	do	do			
847	do	do			5
847	do	do			5
522e	Populus heterophylla	Cotton Tree			4
522	do	do	9,220	1,005,000	
961a	Populus balsamifera	Balsam Poplar; Balm of Gilead.	8,230	1,173,000	4
961b	do	do	7,550	1,220,000	4
1054a	Populus balsamifera, var. candicans.		8,970	939,000	
1054b	do		8,510	1,102,000	
1054	do				4
1054	do				3
552a	Populus angustifolia		5,750	694,000	3
1012a	Populus trichocarpa	Cottonwood	9,790	1,478,000	5
1012b	do	do	9,150	1,478,000	5
1028a	do	do	9,940	1,730,000	5
1028b	do	do	9,240	1,571,000	5
255a	Populus monilifera	do	7,869	949,000	4
304a	do	do	9,480	1,178,000	3
304b	do	do	8,660	990,000	4
309a	do	do			5
309a	do	do	12,810	1,647,000	
309b	do	do	10,890	1,194,000	
309	do	do			5
754a	do	do	12,950	1,981,000	
754b	do	do	13,430	1,730,000	

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Hart.	Sap.	
			Inches.			
Utah	Salt Lake City	Clay				
do	do	City				
do	do	do				
do	do	do				
Colorado	Cañon City					
do	do					
do	do					
do	do					
do	do					
California	Santa Cruz	Moist, sandy				
do	do	do				
do	do	do				
do	Strawberry Valley	Moist, rich				
Oregon	Portland	Alluvial				
do	do	do				
do	do	do				
Utah	City Creek Cañon	Gravelly				
Montana	Pattee's Cañon, Missoula.	Rich, moist				
do	do	do				
Washington Ter.	Seattle	Moist, sandy	6.30	10	22	
do	do	do				
Oregon	Winchester Bay	Sandy, saline				
do	do	do				
California	Santa Cruz	Sandy loam	5.04		16	
Colorado	Alpine	Damp				
do	do	do				
do	do	do				
Massachusetts	Danvers	Gravelly	5.39	7	17	
do	do	do				
do	do	do	8.66		41	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Tennessee	Nashville	Alluvial				
do	do	do				
Alaska	Chilcoot Inlet	do				
do	do	do				
Massachusetts	Topsfield	Gravelly	7.99	19	11	Cultivated.
do	do	do				Do.
do	do	do				Do.
do	do	do				Do.
Colorado	Manitou Springs	Sandy loam	3.86	11	10	
Oregon	Saint John's Barrel Factory.					
do	do					
do	Portland (Furniture Company).					
do	do					
do	Allenton	Alluvial				
Missouri	do	do				
do	do	do				
do	Dallas	do	31.73		5	
Texas	do	do				
do	do	do				
do	do	do				
do	Chattahoochee	do	9.84	20		
Florida	do	do				
do		do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—C

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
754c	Populus monilifera	Cottonwood	12,200	1,647,000
754e	do	do		
754s	do	do		
659a	Populus Fremontii	do	8,390	1,446,000
659b	do	do	11,600	1,544,000
659c	do	do		
659e	do	do		
659	do	do		
646a	Populus Fremonti, var. Wislezeni.	do	10,520	962,000
646b	do	do	9,860	976,000
909a	do	do	11,410	2,241,000
909b	do	do	10,090	1,283,000
912e	do	do		
912s	do	do		
912	do	do	8,310	1,134,000
912	do	do	9,200	1,178,000
634a	Libocedrus decurrens	White Cedar	8,890	1,158,000
634b	do	do	10,080	1,158,000
662a	do	do	11,220	1,308,000
662b	do	do	9,390	1,283,000
662c	do	do	9,390	1,360,000
662e	do	do		
662e	do	do		
662	do	do		
379a	Thuja occidentalis	do	6,530	694,000
379b	do	do	6,310	631,000
782e	do	do		
782e	do	do		
782	do	do	7,808	806,000
782	do	do		
783a	do	do	7,550	816,000
783a	do	do		
783b	do	do	6,400	890,000
783e	do	do		
783e	do	do		
790a	do	do	8,390	902,000
790b	do	do	8,420	790,000
790e	do	do		
790e	do	do		
790	do	do		
792a	do	do	5,660	472,000
792b	do	do	5,050	396,000
792c	do	do	5,060	378,000
792e	do	do		
792e	do	do		
796e	do	do		
796e	do	do		
796	do	do		
796	do	do		
874a	do	do		
874a	do	do	8,400	1,139,000
874b	do	do	9,530	1,134,000
874	do	do		
1099a	do	do	8,400	816,000
1099b	do	do	9,360	816,000
1017a	Thuja gigantea	Red Cedar	11,740	1,536,000
1017b	do	do	11,760	1,544,000
1017e	do	do		
1017s	do	do		
1017	do	do		
1021a	do	do	9,120	1,416,000
1021b	do	do	10,370	1,478,000
350a	Chamæcyparis sphæroidea.	White Cedar	4,700	385,000
350b	do	do	5,460	485,000

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Florida	Chattahoochee	Alluvial				
do	do	do				
do	do	do				
California	Sacramento Valley	do	11.48	19	16	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	San Bernardino					
do	do					
California	(Saw-mill, Strawberry Valley.)					
do	do					
do	(Saw-mill, San Bernardino Mount'ns.)					
do	do					
do	do					
do	do					
do	do					
do	do					
Vermont	Monkton	Cold, peaty				
do	do	do				
New Brunswick						
do						
do						
do						
do	Bridgeton					
do	do					
do	do					
do	do					
do	do					
Province of Quebec.	Amqui					
do	do					
do	do					
do	do					
do	do					
do						
do						
do						
do						
do						
do						
do						
do						
Maine	Matawamkeag		6.77	71	19	
do	do					
do	do					
do	do					
Wisconsin	Eau Claire	Drift				
do	do	do				
Oregon	(Wiedler's saw-mill, Portland.)					
do	do					
do	do					
do	do					
do	do					
do	Portland (Furniture Company).					
do	do					
Alabama	Cottage Hill	Sandy, wet	11.73	21	6	
do	do					

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Conti

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs sq.
250e	Chamæcyparis sphæroidea.	White Cedar			3,
350e	do	do			3,
350	do	do			
850a	do	do	6, 940	681, 000	
850b	do	do	7, 910	579, 000	
850e	do	do			3,
850e	do	do			3,
851a	do	do	6, 720	631, 000	
851b	do	do	7, 300	723, 000	
851e	do	do			
851e	do	do			3,
851	do	do			4,
852e	do	do			3,
852e	do	do			3,
852	do	do	6, 720	517, 000	
969a	Chamæcyparis Nutkaensis	Alaska Cedar; Yellow Cedar	12, 200	1, 158, 000	
969b	do	do	9, 990	1, 544, 000	
969	do	do			5,
969	do	do			6,
983a	do	do	14, 610	1, 730, 000	7,
983b	do	do	13, 360	1, 823, 000	6,
994a	do	do	12, 500	1, 608, 000	
994b	do	do	13, 450	1, 647, 000	
994c	do	do	13, 340	1, 618, 000	
994e	do	do			6,
994e	do	do			6,
1000a	do	do	10, 030	1, 237, 000	
1000b	do	do	4, 040	1, 085, 000	
1000e	do	do			6,
1000	do	do			6,
701a	Chamæcyparis Lawsoniana.	Port Oxford Cedar	11, 760	1, 367, 000	6,
707a	do	do	11, 740	1, 730, 000	
707b	do	do	14, 760	1, 981, 000	
707e	do	do			6,
707e	do	do			6,
675a	Cupressus macrocarpa	Monterey Cypress	14, 910	1, 657, 000	
675b	do	do	15, 100	1, 544, 000	
675b	do	do			
691a	Cupressus Goveniana		7, 470	654, 000	5,
691b	do		9, 450	816, 000	
691	do				6,
1100a	Cupressus Macnabiana		9, 120	816, 000	
1100b	do		4, 910	649, 000	
1100e	do				4,
1100	do				4,
624	Juniperus occidentalis	Juniper			
624	do	do			
939e	Juniperus occidentalis, var. conjugens.	Cedar			
939e	do	do			
939	do	do			8,
1102a	do	do	6, 720	1, 020, 000	6,
1102	do	do			8,
692a	Juniperus pachyphlœa	do	11, 220	926, 000	
892b	do	do	10, 600	846, 000	
14a	Juniperus Virginiana	Red Cedar	10, 060	701, 000	
14b	do	do	10, 640	731, 000	
327a	do	do	12, 200	890, 000	
327b	do	do	8, 050	926, 000	
327e	do	do			6,
327	do	do			6,
734a	do	do	15, 100	1, 120, 000	
734b	do	do	14, 780	1, 260, 000	
734	do	do			7,

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Alabama	Cottage Hill	Sandy, wet				
do	do	do	11.73	21	6	
do	do	do				
Massachusetts	Beverly	Swampy			18	Total in heart and sap.
do	do	do				
do	do	do				
do	do	do				
do	do	do			19	Do.
do	do	do				
do	do	do				
do	do	do				
do	do	do			20	Do.
do	do	do				
do	do	do				
Alaska	Sitka					
do	do					
do	do					
do	do					
British Columbia	Victoria (saw-mill)					
do	do					
Alaska	Perils Strait					
do	do					
do	do					
do	do					
do	do					
do	Portland (Weidler's saw-mill).					
do	do					
do	do					
do	do					
Oregon	Marshfield (Dean & Co.'s saw-mill).					
do	do					
do	do					
do	do					
do	do					
California	Monterey	Gravelly loam	11.14		95	Do.
do	do	do				
do	do	do				
do	Marin	Dry ridges				
do	do	do				
do	do	do				
do	Calistoga	do	9.21		36	
do	do	do				
do	do	do				
do	do	do	9.21		36	
do	Yreka Plains	Gravelly				
do	do	do				
Texas	Austin	Limestone	5.28	28	23	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Arizona	Santa Rita Mount'ns	Gravelly				
do	do	do				
Massachusetts	Brookline	Drift	9.06	49	19	
do	do	do				
Texas	Dallas	Calcareous	19.05	66	16	
do	do	do				
do	do	do				
do	do	do				
Florida	Chattahoochee	do				
do	do	do				
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Conti

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs. sq.
734	Juniperus Virginiana	Red Cedar			6,
800*a*	do	do	10, 830	1, 102, 000	
800*b*	do	do	11, 560	1, 242, 000	
800*c*	do	do			5,
800	do	do			6,
837*c*	do	do			
837*a*	do	do			
837	do	do			4,
837	do	do			4,
924	do	do	12, 750	1, 266, 000	
1055	do	do			5,
1055	do	do			6,
1249*a*	do	do	10, 750	1, 178, 000	7,
1250*a*	do	do	5, 640	631, 000	5,
1251	do	do	6, 720	868, 000	
1252	do	do	12, 810	966, 000	
1253*a*	do	do	7, 470	868, 000	5,
1254	do	do	10, 080	926, 000	
535*a*	Taxodium distichum	Cypress	9, 680	1, 536. 000	
535*b*	do	do	9, 530	1, 730, 000	
535*c*	do	do			6,
535*f*	do	do			7,
542*c*	do	do			
542*c*	do	do			6,
542	do	do			6,
741*a*	do	do	9, 860	1, 289. 000	
741*b*	do	do	10, 030	1, 333, 000	
741*c*	do	do			5,
741	do	do			5,
657*a*	Sequoia gigantea	Big Tree	7, 300	846. 000	
657*b*	do	do	6, 720	662, 000	
657*c*	do	do			5,
657*e*	do	do			5,
666	do	do	5, 760	511, 000	
673*a*	Sequoia sempervirens	Redwood	9, 150	772, 000	
673*b*	do	do	10, 080	1, 020, 000	6,
673*b*	do	do			6,
710	do	do	9, 360	991, 000	6,
711*a*	do	do	8, 320	1, 068, 000	
711*b*	do	do	8, 390	816, 000	5,
711	do	do			7,
712*a*	do	do	5, 640	772, 000	4,
712*b*	do	do	8, 400	923, 000	4,
713*a*	do	do	8, 000	1, 260, 000	
713*b*	do	do	9, 070	952, 000	
713*c*	do	do			6,
713*f*	do	do			5,
714*a*	do	do	10, 520	1, 068, 000	
714*b*	do	do	11, 530	962, 000	
714	do	do			6,
715*a*	do	do	4, 240	926, 000	5,
978*a*	Taxus brevifolia	Yew	16, 480	1, 260, 000	
978*b*	do	do	14, 490	926, 000	5,
978	do	do			7,
62*a*	Torreya taxifolia	Stinking Cedar	13, 540	923, 000	
62*a*	do	do			
62*c*	do	do			6,
62*e*	do	do			6,
277*a*	do	do	12, 090	1, 388, 000	
277*b*	do	do	12, 500	1, 266, 000	
277*e*	do	do			6,
277	do	do			6,
651*a*	Torreya California	California Nutmeg	6, 720	648, 000	4,
651*b*	do	do	10, 030	631, 000	
651*b*	do	do			
651	do	do			5,
1*b*	Pinus strobus	White Pine	9, 790	1, 340, 000	
1*c*	do	do			4,
1*e*	do	do			
1	do	do			4,

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Florida	Chattahoochee	Calcareous				
do	Saint John's River	Sandy loam				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Danvers	Drift				
do	do	do				
do	do	do				
do	do	do				
Florida	Chattahoochee	Alluvial				
Massachusetts	Topsfield	Drift				
do	do	do				
Alabama	Stockton	Alluvial	9.84		58	Total in heart and sap.
do	do	do				
do	do	do				
do	do	do				
do	Otis & Co. (saw-mill)					White cypress.
do	do					
do	do					
Florida	Chattahoochee		20.24	230	55	Do.
do	do					Do.
do	do					Do.
do	do					Do.
California	Tulare	Granite				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Russian River					
do	do					
do	do					
do	Santa Cruz					Top.
California	Mendocino					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					Grain curled.
Oregon	Portland	Moist, rich				
do	do	do				
do	do	do				
Florida	Chattahoochee	Alluvial				
do	do	do				
do	do	do				
do	do	do				
do	do	Calcareous	11.18	78	12	
do	do	do				
do	do	do				
do	do	do				
California	Marin	Stony	14.21	73	20	
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Brookline	Drift	20.08	51	19	
do	do	do				
do	do	do				
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Co

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
222a	Pinus strobus	White Pine	11,530	868,000
777c	do	do		
777e	do	do		
777	do	do	9,120	1,416,000
777	do	do	6,070	926,000
788a	do	do	9,390	1,478,000
788b	do	do	9,870	1,478,000
788b	do	do		
788	do	do		
788	do	do		
789a	do	do	8,170	1,051,000
789b	do	do	7,550	1,035,000
789b	do	do		
789	do	do		
789	do	do		
797a	do	do	9,210	1,388,000
797b	do	do	8,900	1,215,000
797	do	do		
797	do	do		
1044a	do	do		
1044a	do	do	5,610	962,000
1044b	do	do	8,400	1,283,000
1044e	do	do		
1044e	do	do		
975a	Pinus monticola	do	9,820	1,730,000
975	do	do		
987a	do	do	7,560	1,035,000
987b	do	do	8,830	1,266,000
987e	do	do		
987e	do	do		
987	do	do		
638a	Pinus Lambertiana	Sugar Pine	9,860	1,266,000
668a	do	do	8,280	1,051,000
668b	do	do	9,410	1,158,000
730a	do	do	7,780	1,158,000
730b	do	do	7,590	1,051,000
819a	Pinus flexilis	White Pine	9,850	1,178,000
819b	do	do	9,100	1,068,000
819c	do	do	11,120	1,260,000
819e	do	do		
819	do	do		
913a	do	do	5,690	542,000
992a	Pinus albicaulis		6,650	525,600
992b	do		10,060	949,000
992	do			
661a	Pinus reflexa	White Pine	9,900	1,260,000
661b	do	do	12,200	1,446,000
661b	do	do		
661	do	do		
661	do	do		
656a	Pinus Parryana		4,970	555,000
656b	do		7,230	534,000
656e	do			
656e	do			
656	do			
656	do			
397a	Pinus edulis	Piñon Nut Pine	6,420	609,000
397e	do	do		
882a	Pinus monophylla	do	4,040	598,000
915a	do	do	4,240	739,000
631a	Pinus Balfouriana	Foxtail Pine; Hickory Pine	4,160	772,000
631b	do	do	7,990	949,000
821a	Pinus Balfouriana, var. aristata.	Foxtail Pine	11,070	1,266,000
821b	do	do	9,760	990,000
821c	do	do	6,720	828,000
821e	do	do		
821e	do	do		

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Vermont	Charlotte	Wet, swampy				
New Brunswick						
....do						
....do						
....do						
....do	Bridgeton					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Province of Quebec	Amqui					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do						
....do						
....do						
....do						
Massachusetts	Reading	Drift	8.46	16	15	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
British Columbia	Bussard's Inlet (saw-mill).					
....do	....do					
Oregon	Cascade Mountains.	Moist loam				3,800 feet elevation.
....do	....do	....do				Do.
....do	....do	....do				Do.
....do	....do	....do				Do.
....do	....do	....do				Do.
California	Strawberry Valley (saw-mill).					
....do						
....do						
....do						
....do	Lassen's Peak					
Colorado	Forrest City	Gravelly	19.76	120	38	Tree grown at an elevation of 10,000 feet.
....do	....do	....do				Do.
....do	....do	....do				Do.
....do	....do	....do				Do.
....do	....do	....do				Do.
Nevada	Danville	....do				
British Columbia	Silver Mount'n, near Frazer River.		19.45	160	50	
....do	....do					
Arizona						
....do	Santa Rita Mount's.					
....do	....do					
....do	....do					
....do	....do					
California	San Diego					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Colorado	....do					
....do	Cañon City					
Utah	....do	Gravelly	11.18	79	30	
Nevada	Lewiston	....do				
California	Danville	Rocky	6.46	66	19	
....do	Scott Mountains	Gravelly				
Colorado	....do	Rocky	14.49	309	75	
....do	Forest City	....do	17.72	136	44	
....do	....do					
....do	....do					
....do	....do					
	....do					

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Cont

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
821	Pinus Balfouriana, var. aristata.	Foxtail Pine		
821	do	do		
914a	do	do	9,940	879,000
315a	Pinus resinosa	Red Pine; Norway Pine	12,840	2,040,000
315b	do	do	13,420	1,981,000
785a	do	do	11,560	1,478,000
785b	do	do	9,620	1,158,000
785c	do	do		
785e	do	do		
785	do	do		
1074a	do	do	11,100	1,446,000
1074	do	do		
1075a	do	do	10,080	1,478,000
1075	do	do		
1076a	do	do	11,660	1,544,000
1076b	do	do	11,470	1,823,000
1076	do	do		
996a	Pinus Torreyana		11,590	890,000
996b	do		10,080	555,000
996	do			
996	do			
996	do			
1154a	Pinus Arizonica	Yellow Pine	10,088	1,035,000
1154b	do	do	7,930	1,215,000
1154c	do	do		
1154e	do	do		
1155a	do	do	8,510	1,283,000
1155b	do	do	11,010	1,283,000
1155c	do	do		
1155e	do	do		
1156a	do	do	9,270	1,242,000
1156c	do	do		
1156e	do	do		
619a	Pinus ponderosa	do	12,640	1,925,000
626a	do	do	13,340	1,657,000
630a	do	do	6,380	271,000
630b	do	do	5,490	377,000
632a	do	do	12,960	1,730,000
636a	do	do	11,190	1,158,000
689a	do	do	14,910	1,885,000
718a	do	do	10,980	1,618,000
718b	do	do	11,740	1,647,000
731a	do	do	11,240	1,730,000
731b	do	do	11,410	1,647,000
907a	do	do	5,612	445,000
910a	do	do	6,300	385,000
633a	Pinus Jeffreyi		8,400	731,000
633b	do		4,540	593,000
667a	do		12,930	2,040,000
667b	do		15,110	1,925,000
667c	do			
667e	do			
667	do			
664a	Pinus Chihuahuana		12,960	962,000
664b	do		10,800	1,051,000
664c	do			
664e	do			
664	do			
997a	Pinus contorta	Scrub Pine	15,020	2,463,000
997b	do	do	13,490	1,961,000
997	do	do		
997	do	do		
293a	Pinus contorta, var. Murrayana.		4,120	772,000
293b	do		4,960	747,000

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Colorado	Forest City					
... do	... do					
Nevada		Rocky				
Michigan	Hersey					
....do	....do					
New Brunswick	Bridgeton					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Vermont	Charlotte					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
California	San Diego	Sandy	9.21	8	32	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Arizona	Santa Rita Mountains.	Rocky				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Dakota	Deadwood	Gravelly				
Oregon	Ashland (saw-mill)					
California	Strawberry Valley	Low, wet				
....do	....do	....do				
....do	Strawberry Valley					
Oregon	Ashland (saw-mill)					
California	San Bernardino (saw-mill).					
Montana	Missoula (saw-mill)					
... do	....do					
California	Lasson's Peak					
....do	....do					
Colorado	Cañon City					
... do	... do					
California	Scott Mountains					
... do	Scott Mountains					
....do	San Bernardino (saw-mill).					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Arizona	Santa Rita Mountains	Dry, gravelly	20.08	53	102	
....do	... do	....do				
... do	....do	....do				
....do	....do	....do				
... do	....do	....do				
British Columbia	Vancouver's Island	....do				
... do	....do	....do				
....do	....do	....do				
....do	....do	... do				
Colorado	Forest City	Moist, sandy loam	10.59	23	43	
....do	....do	....do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Conti

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.		Compression parallel
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.	
					Lbs
293*c*	Pinus contorta, var. Murrayana.				
293*c*	....do				
563*a*	....do		10,640	1,388,000	
625*a*	....do		9,680	1,308,000	
625*b*	....do		11,040	1,388,000	
644*a*	Pinus Sabiniana	Dagger Pine; Bull Pine	10,600	772,000	
644*b*	....do	....do	11,760	902,000	
644	....do	....do			
1157*a*	Pinus Coulteri	Bull Pine; Yellow Pine	11,740	1,730,000	
1157*b*	....do	....do	10,080	1,510,000	
1157	....do	....do			
1157	....do	....do			
676*a*	Pinus insignis		9,610	1,220,000	
676*b*	....do		11,590	1,478,000	
676*b*	....do				
676	....do				
576*a*	Pinus tuberculata		4,190	503,000	
576*b*	....do		7,550	673,000	
82*a*	Pinus tæda	Loblolly Pine; Old Field Pine	14,330	2,317,000	
82*b*	....do	....do	17,630	2,317,000	
82*c*	....do	....do			
82*c*	....do	....do			
382	....do	....do			
355*a*	....do	....do	11,310	859,000	
355*b*	....do	....do	9,530	1,199,000	
355*c*	....do	....do			
355*c*	....do	....do			
355	....do	....do			
355	....do	....do			
388*a*	....do	....do	14,520	1,741,000	
388*b*	....do	....do	8,080	1,266,000	
388*c*	....do	....do			
388*c*	....do	....do			
88	....do	....do			
389*a*	....do	....do			
389*a*	....do	....do	11,100	1,360,000	
389*b*	....do	....do	11,410	1,478,000	
389	....do	....do			
389	....do	....do			
13*a*	Pinus rigida	Pitch Pine; Yellow Pine	11,420	868,000	
13*b*	....do	....do	12,200	1,085,000	
13*b*	....do	....do			
1046*a*	....do	....do	9,270	753,000	
1046*b*	....do	....do	9,510	514,000	
1046*c*	....do	....do			
1046*c*	....do	....do			
83*a*	Pinus serotina	Pond Pine	16,620	1,688,000	
83*b*	....do	....do	16,800	1,608,000	
83*c*	....do	....do			
83*c*	....do	....do			
622*a*	Pinus inops	Jersey Pine; Scrub Pine	8,050	994,000	
621*a*	....do	....do	9,760	660,000	
621	....do	....do			
1169*a*	....do	....do	12,270	1,158,000	
1169*b*	....do	....do	7,170	731,000	
1169*c*	....do	....do			
1169*c*	....do	....do			
1172*a*	....do	....do	10,370	578,000	
1172*b*	....do	....do	9,150	489,000	
1172*c*	....do	....do			
1172*c*	....do	....do			
279*a*	Pinus inops, var. clausa		6,170	772,000	
279*b*	....do		8,230	747,000	
279*b*	....do				
279	....do				
321*a*	Pinus pungens	Table Mountain Pine; Black Pine.	11,050	836,000	
321*b*	....do	....do	9,760	1,388,000	
321*c*	....do	....do			
321*c*	....do	....do			

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Colorado	Forest City	Moist, sandy loam				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
California	Contra Costa	Gravelly	12.28	Total 43		
do	do	do				
do	do	do				
do	San Bernardino	Dry, gravelly				
do	do	do				
do	do	do				
do	do	do				
do	Monterey	Gravelly loam	21.42	Total 35		
do	do	do				
do	do	do				
do	do	do				
do	Mount Shasta	Gravelly	16.45	18	35	
do	do	do				
Florida	Duval	Moist, sandy	1.34	6	27	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Alabama	Cottage Hill	Low, rich				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
North Carolina	Wilmington	Loam				Rosemary Pine.
do	do	do				De.
do	do	do				Do.
do	do	do				Do.
do	do	do				Do.
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Massachusetts	Brookline	Drift	10.51	15	21	
do	do	do				
do	do	do				
			9.05	8	26	
Florida	Duval	Moist, sandy loam	12.28	19	33	
do	do	do				
do	do	do				
do	do	do				
South Carolina	Aiken	Dry, sandy	6.46	34	28	
do	do	do	8.11	42	8	
do	do	do				
Indiana	New Albany					
do	do					
do	do					
do	do					
New Jersey	Mount Holly					
do	do					
do	do					
do	do					
Florida	Apalachicola	Dry, sandy barrens	9.37	26	6	
do	do	do				
do	do	do				
do	do	do				
Virginia	Wytheville	Clay	10.39	35	20	
do	do	do				
do	do	do				
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Con

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
321	Pinus pungens	Table Mountain Pine; Black Pine.		
671a	Pinus muricata		14,420	1,618,000
671b	do		15,200	1,981,000
671c	do			
278a	Pinus mitis	Yellow Pine	12,580	1,823,000
278a	do	do		
278b	do	do	15,130	2,046,000
278	do	do		
319a	do	do	17,050	2,040,000
319	do	do		
142a	Pinus glabra	Spruce Pine	6,720	976,000
142b	do	do	8,190	962,000
544a	do	do	3,780	312,000
544b	do	do	4,880	347,000
544c	do	do	6,200	347,000
544c	do	do		
544e	do	do		
544	do	do		
544	do	do		
764a	do	do	10,960	747,000
764b	do	do	9,070	836,000
764c	do	do		
764e	do	do		
394a	Pinus Banksiana	Scrub Pine; Gray Pine	8,230	818,000
394b	do	do	9,300	1,035,000
394	do	do		
780a	do	do	13,570	1,996,000
780b	do	do	8,160	1,439,000
780b	do	do		
780	do	do		
879a	do	do	6,430	1,388,000
879b	do	do	10,370	1,618,000
879b	do	do		
879	do	do		
81a	Pinus palustris	Long-Leaved Pine; Southern Pine.	16,650	2,317,000
81b	do	do	18,150	2,317,000
81c	do	do	11,760	1,657,000
81d	do	do	17,780	2,317,000
85a	do	do	11,770	1,388,000
85b	do	do	14,850	2,170,000
85c	do	do	13,450	1,618,000
85d	do	do	13,420	879,000
85e	do	do		
85e	do	do		
85	do	do		
243a	do	do	18,150	2,297,000
243b	do	do	18,500	2,056,000
243c	do	do		
243c	do	do		
243	do	do		
243	do	do		
302e	do	do		
302e	do	do		
302	do	do		
302	do	do		
357a	do	do	16,800	2,103,000
357b	do	do	21,060	2,579,000
357c	do	do		
357c	do	do		
357	do	do		
357	do	do		
358a	do	do	18,480	1,925,000
358b	do	do	19,980	2,762,000
358c	do	do		
358c	do	do		
359a	do	do	17,690	2,485,000
359a	do	do		
359	do	do		

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Virginia	Wytheville	Clay				
California	Marin	Gravelly	9.57	total	29	
do	do	do				
do	do	do				
Florida	Chattahoochee	Clay	5.90	total	33	
do	do	do				
do	do	do				
do	do	do				
Louisiana	Ameta	Sandy loam				
do	do	do				
South Carolina	Bonneau's Depot	Rich upland				
do	do	do				
Mississippi	Gainesville	Low, sandy				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Chattahoochee	Low, wet				
do	do	do				
do	do	do				
do	do	do				
Michigan	Baldwin	Low, sandy				
do	do	do				
do	do	do				
New Brunswick						
do						
do						
do						
do						
do						
do						
do						
Florida	Duval	Sandy loam	13.90	119	25	
do	do	do				
do	do	do				
do	do	do				
do	do	Moist, sandy	13.98	51	46	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Saint John's (saw-mill).					
do	do					
do	do					
do	do					
do	do					
do	do					
South Carolina	Aiken	Sandy loam				
do	do	do				
do	do	do				
do	do	do				
Alabama	Cottage Hill	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	Citronelle	do				
do	do	do				
do	do	do				
do	do	do				
do	Chunchula	do				
do	do	do				
do	do	do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Con

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
360a	Pinus palustris	Long-Leaved Pine; Southern Pine.	19, 820	2, 654, 000
360b	do	do	16, 770	1, 981, 000
360c	do	do		
360e	do	do		
361a	do	do	18, 450	2, 654, 000
361a	do	do		
361b	do	do	18, 980	2, 878, 000
361	do	do		
361	do	do		
384a	do	do	9, 220	1, 388, 000
384b	do	do	16, 800	2, 398, 000
384c	do	do		
384e	do	do		
385a	do	do	15, 000	1, 730, 000
385c	do	do		
385e	do	do		
385	do	do		
385	do	do		
390a	do	do	16, 320	2, 463, 000
390b	do	do	15, 220	2, 103, 000
390c	do	do		
390e	do	do		
390f	do	do		
390f	do	do		
1096a	do	do	16, 700	1, 775, 000
1096b	do	do	15, 710	2, 040, 000
84a	Pinus Cubensis	Slash Pine; Bastard Pine	16, 780	1, 657, 000
84b	do	do	15, 020	1, 730, 000
84c	do	do	18, 480	2, 103, 000
84e	do	do		
84e	do	do		
84	do	do		
356a	do	do	18, 220	2, 878, 000
356b	do	do	21, 010	2, 762, 000
356c	do	do		
356e	do	do		
356	do	do		
356	do	do		
493a	do	do	16, 770	2, 103, 000
493b	do	do	14, 330	2, 317, 000
493c	do	do		
493e	do	do		
493	do	do		
493	do	do		
231a	Picea nigra	Black Spruce; Red Spruce	13, 340	2, 040, 000
231b	do	do	12, 930	1, 730, 000
231c	do	do		
231e	do	do		
373a	do	do	10, 020	1, 340, 000
776a	do	do	7, 240	1, 510, 000
776b	do	do	11, 950	1, 730, 000
776b	do	do		
776	do	do		
794a	do	do	10, 290	1, 618, 000
794b	do	do	10, 060	1, 388, 000
794b	do	do		
794	do	do		
880a	do	do	9, 830	1, 388, 000
880a	do	do		
880b	do	do	10, 630	1, 158, 000
880	do	do		
513a	Picea alba	White Spruce	10, 550	1, 068, 000
513b	do	do	10, 080	990, 000
513c	do	do		
513e	do	do		
513	do	do		
620c	do	do		
620e	do	do		

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Alabama	Chunchula	Sandy loam				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Cedar Keys (saw-mill).					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
do	do					
North Carolina	Wilmington					
do	do					
do	do					
do	do					
do	do					
do	do					
Alabama	Mobile					Tree boxed 18 or 20 years ago.
do	do					
Florida	Duval	Moist, sandy	12.83	50	58	
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do	12.83	50	58	
Alabama	Cottage Hill	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Florida	Bay Biscayne	Coral				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
do	do	do				
Vermont	Charlotte	Cold, peaty				
do	do	do				
do	do	do				
do	Huntington	do				
New Brunswick	Bay of Fundy	Gravelly				Var. rubra.
do	do					
do	do					
do	do					
Province of Quebec	Danville					
do	do					
do	do					
do	do					
New Brunswick	Bridgeton					
do	do					
do	do					
do	do					
New Hampshire	Stratford					
do	do					
do	do		7.82	22	16	
do	do					
do	do					
Dakota	Terry's Peak					
do	do	Gravelly				
		do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Co

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
778a	Picea alba	White Spruce	11,650	1,741,000
778b	do	do	11,370	1,571,000
778c	do	do		
778e	do	do		
784a	do	do	9,900	1,446,000
784b	do	do	10,490	1,388,000
784c	do	do		
784e	do	do		
784	do	do		
784	do	do		
791a	do	do	11,620	1,775,000
791b	do	do	10,080	1,647,000
791c	do	do		
791e	do	do		
791	do	do		
791	do	do		
292a	Picea Engelmanni	Spruce	10,860	1,544,000
292b	do	do	6,020	790,000
292c	do	do		
292e	do	do		
575a	do	do	7,850	1,068,000
822c	do	do		
822	do	do	8,280	1,199,000
269a	Picea pungens	do	6,330	772,000
270₁a	do	do	5,550	631,000
270₂a	do	do	7,750	966,000
970a	Picea Sitchensis	Tide Water Spruce	10,520	1,416,000
970b	do	do	10,630	1,580,000
970c	do	do		
970e	do	do		
970	do	do		
970	do	do		
977a	do	do	9,770	1,730,000
977b	do	do	9,100	1,544,000
977c	do	do		
977e	do	do		
977	do	do		
977	d0	do		
1015a	do	do	11,120	1,981,000
1015	do	do		
1019a	do	do	8,810	1,380,000
1019b	do	do	9,650	1,510,000
1019c	do	do		
1019	do	do		
1026a	do	do	7,930	936,000
1026b	do	do	6,170	868,000
5a	Tsuga Canadensis	Hemlock		
5a	do	do	8,230	1,242,000
5b	do	do	8,400	1,102,000
219a	do	do	10,500	1,478,000
219b	do	do	11,420	1,416,000
219c	do	do		
219e	do	do		
775a	do	do	9,730	668,000
775b	do	do	9,120	614,000
775	do	do		
775	do	do		
778a	do	do	7,780	990,000
778b	do	do	7,590	936,000
778c	do	do		
778e	do	do		
778	do	do		
787a	do	do	10,700	1,388,000
787b	do	do	11,340	1,544,000
787c	do	do		
787f	do	do		
793a	do	do	12,650	1,730,000
793b	do	do	14,080	1,925,000

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
New Brunswick	Bay of Fundy	Gravelly				
....do	....do	....do				
....do	....do					
....do	....do					
....do	Bridgeton					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Province of Quebec	Amiqui					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Colorado	Forest City	Damp	12.60	76	8	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	Peaty				
....do	....do	....do	12.52	71	45	Tree with gray bark.
....do	....do	....do				
....do	Alpine	Damp				
....do	....do	....do				
....do	....do	....do				
Alaska	Sitka					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
British Columbia	Barrald's Inlet (saw-mill).					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Oregon	Portland (Weidler's mill).					
....do	....do					
....do	Astoria (saw-mill)					
....do	....do					
....do	....do					
....do	....do					
....do	Portland (Furniture Company).					
....do	....do					
Massachusetts	Brookline	Drift	15.04	57	37	
....do	....do	....do				
....do	....do	....do				
Vermont	Charlotte	Gravelly				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
New Brunswick	Bay of Fundy					
....do	....do					White Hemlock.
....do	....do					Do.
....do	....do					Do.
....do						Do.
....do						
....do						
....do						
....do						
....do						
....do	Bridgeton					
....do	....do					
....do	....do					
....do	....do					
Province of Quebec	Danville					
....do	....do					

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Con

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
793e	Tsuga Canadensis	Hemlock		
793e	do	do		
793	do	do		
793	do	do		
772a	do	do	12,900	1,603,000
772b	do	do	13,270	1,730,000
772e	do	do		
772e	do	do		
772	do	do		
817a	do	do	9,180	1,446,000
817b	do	do	8,000	1,158,000
817e	do	do		
817e	do	do		
1040a	do	do	12,170	1,035,000
1040b	do	do	12,320	1,102,000
1040e	do	do		
1040e	do	do		
1040	do	do		
1040	do	do		
1042a	do	do	10,080	1,416,000
1042b	do	do	10,080	1,242,000
1042e	do	do		
1042e	do	do		
1042	do	do		
1042	do	do		
623a	Tsuga Caroliniana	do	6,620	990,000
971a	Tsuga Mertensiana	do	8,170	1,456,000
971	do	do		
995a	do	do		
995a	do	do	15,830	2,317,000
995b	do	do	15,110	2,040,000
995	do	do		
995	do	do		
980a	Tsuga Pottoniana	do	10,310	1,102,000
980b	do	do	10,320	1,139,000
980e	do	do		
980e	do	do		
980	do	do		
271$_2$a	Pseudotsuga Douglasii	Red Fir; Yellow Fir	11,130	1,237,000
271$_2$b	do	do	9,550	1,308,000
271$_2$	do	do	12,170	1,688,000
627a	do	do	15,050	2,170,000
627b	do	do	13,430	2,170,000
702a	do	do	8,220	1,395,000
704a	do	do	13,450	2,485,000
705a	do	do	13,370	1,872,000
706a	do	do	13,430	1,981,000
708a	do	do	17,920	2,398,000
708b	do	do	18,880	2,555,000
709a	do	do	10,980	1,544,000
709b	do	do	11,480	1,446,000
709e	do	do		
709e	do	do		
720a	do	do	10,080	1,510,000
720b	do	do	13,200	1,730,000
732a	do	do	11,760	1,823,000
732b	do	do	10,080	1,647,000
881a	do	do	13,370	1,360,000
881b	do	do	14,000	1,510,000
881e	do	do		
881e	do	do		
881	do	do		
973a	do	do	11,070	1,730,000
973b	do	do	11,760	1,608,000

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
Province of Quebec.	Danville					
... do	...do					
....do	...do					
....do	...do					
New Brunswick						Red Hemlock.
... do						Do.
... do						Do.
....do						Do.
....do						Do.
West Virginia	Grafton					
....do	...do					
....do	...do					
....do	...do					
Massachusetts	Danvers	Moist loam				
....do	...do	...do				
....do	...do	...do				
....do	...do	...do				
... do	...do	...do				
....do	North Reading					
....do	...do					
....do	...do					
....do	...do					
....do	...do					
....do	...do					
North Carolina	Hendersonville	Dry, rocky	8.98	51	14	
Washington Ter.	Wilkinsons	Rich loam				
....do	...do	...do				
Alaska	Sitka					
....do	...do					
....do	...do					
....do	...do					
....do	...do					
British Columbia	Silver Peak near Fraser River.	Gravelly loam				
....do	...do	...do				
....do	...do	...do				
....do	...do	...do				
....do	...do	...do				
			10.87	155	40	
California	Strawberry Valley (saw-mill).					
....do	...do					
Oregon	Marshfield (saw-mill)					
....do	...do					
....do	Marshfield (E. B. Dean's saw-mill).					Grows near the ocean.
....do	...do					Coarse grained, best quality.
....do	...do					Fine grained, best quality.
... do	...do					Coast Fir.
....do	...do					Do.
....do	...do					20 miles from coast clear yellow.
....do	...do					Do.
....do	...do					Do.
Montana	Missoula (saw-mill).					
....do	...do					
California	Lassen's Peak					
....do	...do					
Utah?	Salt Lake					
....do	...do	Rocky				
....do	...do	...do				
....do	...do	...do				
....do	...do	...do				
British Columbia	Burrard's Inlet (saw-mill).	...do				Red-Fir.
....do	...do					Do.

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Co

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS.	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
974*a*	Pseudotsuga Douglasii	Red Fir. Yellow Fir	12, 930	2, 170, 000
974*b*	do	do		
989*a*	do	do	14, 460	1, 647, 000
989	do	do		
1008*a*	do	do	10, 950	2, 056, 000
1008*b*	do	do	12, 880	2, 317, 000
1016*a*	do	do	13, 570	2, 579, 000
1016*b*	do	do	14, 330	2, 317, 000
1016*c*	do	do		
1016*e*	do	do		
1018*a*	do	do	15, 020	2, 317, 000
1018*a*	do	do		
1018*b*	do	do	15, 110	2, 398, 000
1018	do	do		
1018	do	do		
1020*a*	do	do	11, 040	1, 510, 000
1020*b*	do	do	10, 030	1, 388, 000
1011*a*	do	do	12, 910	2, 170, 000
1011*b*	do	do	9, 990	1, 688, 000
1022*a*	do	do	10, 290	1, 730, 000
1022*b*	do	do	11, 500	1, 571, 000
986*a*	do	do	11, 280	1, 647, 000
642*a*	Pseudotsuga Douglasii, var. macrocarpa.	do	11, 240	1, 478, 000
642*b*	do	do	13, 050	1, 446, 000
642*b*	do	do		
642	do	do		
522*a*	Abies Fraseri		9, 290	1, 510, 000
523*b*	do		8, 020	1, 388, 000
523*c*	do		9, 220	1, 242, 000
523*e*	do			
523*e*	do			
377*a*	Abies balsamea	Balsam Fir	6, 400	1, 051, 000
377*b*	do	do	8, 370	1, 388, 000
377	do	do		
449,*a*	Abies subalpina	Balsam	7, 870	1, 139, 000
449*b*	do	do	5, 320	1, 102, 000
449*a*	do	do	8, 400	1, 173, 000
449*b*	do	do	4, 970	966, 000
820*a*	do	do	7, 410	966, 000
820*b*	do	do	6, 630	1, 068, 000
820*c*	do	do	7, 070	1, 120, 000
820*d*	do	do	6, 720	1, 388, 000
820	do	do		
820	do	do		
1009	Abies grandis		4, 790	1, 085, 000
1010*a*	do		7, 560	1, 741, 000
1010*b*	do		8, 920	1, 580, 000
529*a*	Abies concolor	White Fir	7, 990	1, 051, 000
529*b*	do	do	7, 170	1, 139, 000
529*b*	do	do		
529	do	do		
639*a*	do	do	10, 080	902, 000
639*b*	do	do	10, 950	990, 000
733*a*	do	do	12, 990	1, 989, 000
733*b*	do	do	11, 440	1, 906, 000
1004*a*	Abies amabilis		11, 020	1, 823, 000
1004*b*	do		11, 720	1, 872, 000
1004*c*	do			
1004*a*	do			
965*a*	Abies nobilis			
965*a*	do		12, 980	1, 925, 000
965*b*	do		11, 760	1, 872, 000
965	do			

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
British Columbia	Burrard's Inlet (saw-mill).					Yellow Fir.
....do	....do					Do.
Oregon	Portland (saw-mill).					
....do	....do					
British Columbia	Burrard's Inlet (saw-mill).					
....do	....do					
Oregon	Portland (Weidler's saw-mill).					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	Portland (Furniture Company).					
....do	....do					
....do	Oregon Railway and Navigation Co.					Railroad tie.
....do	....do					
....do	Portland (Furniture Company).					Do.
....do	....do					
....do	Victoria (saw-mill).					
California	San Bernardino (saw-mill).					
....do	....do					
....do	....do					
....do	....do					
North Carolina	Roan Mountain	Peaty loam	7.09		146	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Vermont	Monkton	Peaty				
....do	....do	....do				
....do	....do	....do				
Colorado	Forest City	Moist sandy loam				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Oregon	Portland	....do				
....do	....do	Rich alluvial	28.94	43	56	Same tree.
....do	....do	....do				
Colorado	Engelmann's Cañon	Rocky	7.72	0	29	
....do	....do	....do				
....do	....do	....do				
California	Strawberry Valley	Alluvial				
....do	....do	....do				
....do	Lassen's Peak					
British Columbia	....do					
....do	Peak near Fraser River.	Rich sandy loam	22.99	120	50	
....do	....do	....do				
....do	....do	....do				
Oregon	....do	....do				
....do	Cascade Mountains.	Rich				
....do	....do	....do				
....do	....do	....do				

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—C

Mark on specimen.	NAME OF WOOD.		TRANSVERSE TESTS	
	Botanical.	Common.	Modulus of rupture.	Modulus of elasticity.
647a	Abies magnifica	Red Fir	8,400	694,000
647b	do	do	11,710	1,283,000
647c	do	do	10,080	747,000
647e	do	do		
647	do	do		
226₁e	Larix Americana	Tamarack		
226₁f	do	do		
226₂a	do	do	16,770	2,398,000
226₂b	do	do	15,110	2,485,000
226₂	do	do		
226₂	do	do		
774e	do	do		
774e	do	do		
774	do	do	13,430	2,170,000
774	do	do	11,350	2,241,000
781a	do	do	10,080	1,102,000
781b	do	do	10,280	994,000
781e	do	do		
781e	do	do		
781	do	do		
781	do	do		
786a	do	do	13,240	1,925,000
786b	do	do	15,280	2,056,000
786e	do	do		
786e	do	do		
786	do	do		
795a	do	do	13,440	1,981,000
795b	do	do	12,470	1,823,000
795e	do	do		
795e	do	do		
795	do	do		
795	do	do		
840a	do	do	11,760	1,283,000
840b	do	do	11,800	1,237,000
840e	do	do		
840e	do	do		
840	do	do		
840	do	do		
719a	Larix occidentalis		13,110	1,730,000
719b	do		15,860	2,040,000
984a	do		18,450	2,579,000
984b	do		21,240	2,579,000
984e	do			
984e	do			
984	do			
1006a	do		18,450	2,878,000
1006b	do		18,450	2,762,000
1006b	do			
1006	do			
1006	do			
1159a	Washingtonia filifera		3,920	655,000
1159b	do		6,720	1,068,000
1159	do			
1159	do			

TABLE 4.—CONSOLIDATED TABULATION OF RESULTS—Continued.

WHERE GROWN.		Soil.	Diameter of tree.	NUMBER OF RINGS IN TREE.		Remarks.
State.	Town or county.			Heart.	Sap.	
			Inches.			
California	Soda Springs	Gravelly loam	52.13	307	31	
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Vermont	Charlotte	Cold, swampy				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
New Brunswick	Bay of Fundy					
....do	....do					
....do	....do					
....do	....do					
....do						
....do						
....do						
....do						
....do						
....do	Bridgeton					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	Danville					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
....do	....do					
Massachusetts	Wenham	Swampy				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
Montana	Missoula					
....do	....do					
Washington Ter	Fulda	Moist				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				
California	Agua Caliente	Dry, gravelly				
....do	....do	....do				
....do	....do	....do				
....do	....do	....do				

TABLE 5.—AMERICAN WOODS.

COLOR CLASSIFICATION.

The specimens are arranged in classes according to th
color of the wood.

Those which represent the deepest shades of their clas
merated, followed by those of lighter shades in their rela

From the position occupied in the lists by well-known v
of less familiar specimens will be readily understood.

This arrangement refers only to the particular specin
merated, and to their appearance when freshly dressed a
have changed their color upon exposure to the light.

DARK BROWN.

Number of specimen.	Botanical name.	Common
Heart. 655	Quercus oblongifolia	Evergreen White Oak;
Heart. 1133	Guiacum sanctum	Lignum-vitæ.
Heart. 1131	Cannella alba	
650	Olneya Tesota	Ironwood.
467	Rhus Metopium	Coral Sumac; Burrwoo
459	Drypetes crocea	Guiana Plum.
951	Juglans nigra	Black Walnut.
766	....do	Do.
1139	Colubrina reclinata	Naked Wood.
672	Juglans rupestris	
489	Conocarpus erecta	Button Tree; Buttonw
564	Piscidia Erythrina	Jamaica Dogwood.
682	Schilopsis saligna	Desert Willow; Flowe
340	Persea Carolinensis, var. pubescens	Red Bay.
525	Quercus undulata	White Oak.
61	Diospyros Virginiana	Persimmon.
38	Catalpa speciosa	Western Catalpa.
238	Quercus alba	White Oak.
933	Quercus macrocarpa	Burr Oak.
1103	Quercus Durandii	White Oak; Basket Oa
31_1	Quercus Prinus	Chestnut Oak.
134	Ulmus fulva	Slippery Elm; Red Elm
846	Quercus bicolor	Swamp White Oak.

LIGHT BROWN.

Sap. 655	Quercus oblongifolia	Evergreen White Oak;
490	Avacenia nitida	Black Mangrove.
698	Quercus grisea	
18	Castanea vulgaris, var. Americana	Chestnut.
988	Quercus Garryana	White Oak.
573	Castanea pumila	Chinquapin.
3	Carya alba	Shellbark Hickory; Sh
963	Quercus Kelloggii	Black Oak.
670	Quercus lobata	White Oak.
323	Quercus prinoides	Chinquapin Oak; Yell
547	Quercus alba	White Oak.
762	Quercus lyrata	Over-cup Oak; Water
744	Catalpa bignonioides	Catalpa.
534	Magnolia acuminata	Cucumber Tree.
387	Sassafras officinale	Sassafras.
736	Rhus capillina	Sumac.
763	Prunus serotina	Wild Cherry; Rum Ch
468	Drypetes crocea	Guiana Plum.
688	Quercus Douglasi	Mountain White Oak;
508	Ficus pedunculata	
37	Quercus obtusiloba	Post Oak.
118_3	Carya alba	Shellbark Hickory; Sh
91_2	Carya sulcata	
34_3	Quercus Muhlenbergii	Yellow Oak.
417	Quercus undulata, var. Gambellii	White Oak.

TABLE 5.—AMERICAN WOODS—Continued.

REDDISH BROWN.

Number of specimen.	Botanical name.	Common name.
35	Eugenia monticola	White Stopper.
16	Juglans cinerea	Butternut; White Walnut.
86	Ficus aurea	Wild Fig.
352	Quercus cinerea	Blue Jack.
268	Quercus nigra	Black Jack.
507	Logumcularia racemosa	Black Buttonwood; White Mangrove.
658	Prosopis pubescens	Torrilla Screw Bean; Screwpod Meskit.
8	Quercus alba	White Oak.
961	Populus balsamifera	Balm of Gilead; Balsam Poplar.
245	Quercus falcata	Red Oak; Spanish Oak.
146	Quercus rubra	Red Oak.
821	Pinus Balfouriana, var. Aristata	Foxtail Pine.
851	Chamæcyparis sphæroidea	White Cedar.
47	Quercus palustris	Pin Oak; Swamp Spanish Oak.
381	Pinckneya pubens	Georgia Bark.
89	Quercus rubra	Red Oak.
40₃	Quercus imbricaria	Shingle Oak; Laurel Oak.
676	Pinus insignis	
862	Alnus incana	Speckled Alder.
524	Quercus Michauxii	Basket Oak; Cow Oak.
354	Magnolia glauca	Sweet Bay; White Bay.
237	Carya myristicæformis	Nutmeg Hickory.
229₂	Frakinus pubescens	Red Ash; Bastard Ash.
838	Carya amara	Bitter-nut; Swamp Hickory.
233	Prunus Pennsylvanica	Pigeon Cherry.
1234	Acer saccharinum	Rock Maple; Sugar Maple.

YELLOWISH BROWN.

452	Swietenia Mahogani	**Mahogany.**
585	Persea Carolinensis	**Red Bay.**
460	Condalia ferrea	
81	Pinus palustris	**Long-Leaved Pine; Southern Pine.**
697	Acacia Greggi	**Cat's-Claw.**
454	Regnosia latifolia	**Darling Plum.**
585	Persea Carolinensis	**Red Bay.**
760	Gleditschia monosperma	**Water Locust.**
83	Pinus serotina	**Pond Pine.**
84	Pinus Cubensis	**Slash Pine; Bastard Pine.**
978	Taxus brevifolia	**Yew.**
127	Eugenia procera	**Red Stopper.**
356	Pinus Cubensis	**Slash Pine; Bastard Pine.**
156	Pinus Arizonica	**Yellow Pine.**
389	Pinus Tæda	**Loblolly Pine; Old Field Pine.**
243	Pinus palustris	**Long-Leaved Pine; Southern Pine.**
006	Larix occidentalis	
971	Tsuga Mertensiana	**Hemlock.**
018	Pseudotsuga Douglasii	**Red Fir; Yellow Fir.**
819	Pinus flexilis	**White Pine.**
993	Rhamnus Purshiana	**Bear Berry.**
631	Pinus Balfouriana	**Foxtail Pine; Hickory Pine.**
730	Pinus Lambertiana	**Sugar Pine.**
975	Pinus monticola	**White Pine.**
296	Gymnocladus Canadensis	**Kentucky Coffee Tree.**
996	Gymnocladus Torreyana	
661	Gymnocladus reflexa	**White Pine.**
792	Thuya occidentalis	**White Cedar.**
067	Alnus rubra	
514	Pinus Sabiniana	**Dagger Pine; Bull Pine.**
82	Pinus Tæda	**Loblolly Pine; Old Field Pine.**
564	Pinus Chihuahuana	
461	Sideroxylon mastichodendron	**Mastic.**
492	Chrysophyllum oliviforme	**Satin Wood.**
484	Ilex Dahoon	**Dahoon Holly.**
19	Picea Sitchensis	**Tide Water Spruce.**
64	Hypelate trifoliata	
67	Pinus Jeffreyi	
88	Pinus Strobus	**White Pine.**
47	Abies magnifica	**Red Fir.**
37	Bourreria Havanensis	**Strong Bark.**
20	Pinus Hopei, var. olusa	

TABLE 5.—AMERICAN WOODS—Continued.

DARK RED.

Number of specimen.	Botanical name.	Common name.
458	Mimusops Sieberi	Nase Berry.
453	Coccoloba uvifera	Sea Grape.
485	Rhizophora Mangle	Mangrove.
473	Coccoloba Floridana	Pigeon Plum.
1112	Lysiloma latisiliqua	Wild Tamarind.
606	Prunus umbellata	Hog Plum.
657	Sequoia gigantea	Big Tree.
1258	Juniperus Virginiana	Red Cedar; Savin.
Heart 837	do	Do.
500	Diphotis salicifolia	Red Stopper; Cassada Bustic.
927	Prosopis juliflora algaroba	Meskit; Honey Locust.
463	Hypelate paniculata	Madura Wood; Honey Berry.
710	Sequoia sempervirens	Redwood.
662	Libocedrus decurrens	White Cedar.
642	Pseudotsuga Douglasi, var. macrocarpa	
692	Juniperus pachyphlœa	Cedar.
1017	Thuya gigantea	Red Cedar.
1102	Juniperus occidentalis, var. conjugens	Cedar.
368	Prunus serotina	Wild Cherry; Rum Cherry.
326	Carya olivæformis	Pecan Nut.
1159	Washingtonia filifera	

LIGHT RED.

334	Prunus Americana	Wild Plum; Canada Plum.
344	Ulmus crassifolia	Cedar Elm.
127	Prunus serotina	Wild Cherry; Rum Cherry.
1113	Byrsonema lucida	Tallow Berry.
675	Cupressus macrocarpa	Monterey Cypress.
1062	Prunus Caroliniana	Mock Orange; Wild Olive.
480	Chrysobalanus icaco	Coca Plum.
657	Sequoia gigantea	Big Tree.
770	Quercus Catesbæi	Turkey Oak; Scrub Oak.
414	Gordonia Lasianthus	
1118	Eugenia buxifolia	Stopper; Gurgeon Stopper.
960	Cornus Nuttallii	
239	Cratægus æstivalis	May Haw; Apple Haw.
767	Cratægus flava, var. pubescens	Haw.
1177	Salix petiolaris	
1158	Prunus ilicifolia	Islay.
241	Amelanchier Canadensis	June Berry; Shad Bush.
546	Liquidambar styraciflua	Liquid Amber; Sweet Gum.
17	Quercus tinctoria	Black Oak; Quercitron Oak.
444	Gleditschia triacanthos	Honey Locust.
687	Quercus densiflora	Chestnut Oak.
979	Alnus rhombifolia	
1033	Andromeda ferruginea	
877	Ostrya Virginica	Hop Hornbeam.
646	Populus Fremonti, var. Wealisoni	Cottonwood.
308	Fraxinus viridis	Green Ash.
756	Quercus laurifolia	Laurel Oak.
931	Quercus rubra, var. Texana	
685	Quercus Wislizeni	
663	Quercus agrifolia	
349	Quercus aquatica	Water Oak.
674	Quercus hypoleuca	
586	Myrica cerifera	Wax Myrtle.
341	Cyrilla racemiflora	Leather Wood.
426	Cratægus tomentosa	Black Thorn; Pear Thorn.
435	Prunus Chicasa	Chickasaw Plum.
729	Castanopsis chrysophylla	Chinquapin Chestnut.
338	Cliftonia ligustrina	Iron Wood.
1093	Cratægus crus-galli	Cockspur Thorn.
1081	Cratægus subvillosa	Sweet Haw.

TABLE 5.—AMERICAN WOODS—Continued.

PINKISH WHITE.

Number of specimen.	Botanical name.	Common name.
1077	Cornus Florida	Dogwood.
648	Platanus Wrightii	Sycamore.
643	Arbutus Menziesii	Madrona.
765	Fagus ferruginea	Beech.
683	Arbutis xalapensis	
236	Gordonia Lasianthus	Loblolly Bay.
607	Cratægus arborescens	Thorn.
263	Rhododendron maximum	Big Laurel.
353	Oxydendrum arboreum	Sorrel Wood; Sour Wood.
982	Acer macrophyllum	Oregon Maple.
1067	Pirus coronaria	American Crab-apple.
285	Tilia heterophylla	Bass Wood.
72	Carya tomentosa	Mocker Nut; Big-Bud Hickory.
629	Betula occidentalis	
926	Cratægus spathulata	Hog's Haw.
772	Tsuga Canadensis	Hemlock.
694	Alnus oblongifolia	
1063	Yucca canaliculata	Spanish Dagger.
743	Acer rubrum	Red Maple; Swamp Maple.
848	Betula alba, var. populifolia	White Birch; Gray Birch.
686	Platanus racemosa	Sycamore.
659	Populus Fremontii	Cottonwood.
653	Quercus chrysolepis	California Live Oak.
126	Platanus occidentalis	Sycamore; Buttonwood.
836	Betula papyracea	Canoe Birch; Paper Birch.
1052	Acer dasycarpum	Soft Maple; Silver Maple.
1014	Acer circinatum	Vine Maple.
721	Salix flavescens	
966	Salix Hookeriana	
252	Tilia Americana	White Wood; Bass Wood.
856	Salix nigra	Black Willow.
965	Abies nobilis	
707	Chamæcyparis Lawsoniana	Post Oxford Cedar.
844	Betula lenta	Cherry Birch; Black Birch.
665	Myrica Californica	
799	Quercus virens	Live Oak.
745	Tilia Americana, var. pubescens	Wahoo.
1104	Viburum prunifolium	Black Haw.
20	Acer rubrum	Red Maple; Swamp Maple.
623	Tsuga Caroliniana	Hemlock.
981	Salix lasiandra, var. lancifolia	
752	Quercus coccinea	Scarlet Oak.
19	Ulmus Americana	White Elm; Water Elm.
842	Betula nigra	Red Birch; River Birch.
740	Carya aquatica	Water Hickory; Bitter Pecan Nut.
1171	Quercus heterophylla	Bartram Oak.
512	Quercus Phellos	Willow Oak.
1010	Abies grandis	
964	Fraxinus Oregana	Ash; Oregon Ash.
980	Tsuga Pattoniana	Hemlock.
262a	Kalmia latifolia	Laurel Calico Bush; Spoonwood Ivy.
1040	Tsuga Canadensis	Hemlock.
440	Acer saccharinum, var. nigrum	Black Maple.
1012	Populus trichocarpa	Cottonwood.
758	Planera aquatica	Water Elm.
911	Salix nigra, var. amigdoloides	
637	Prunus demissa	
133	Ulmus alata	Wahoo; Feathered Elm; Winged Elm.
270b	Picea pungens	Spruce.
1067	Betula papyracea	Canoe Birch; Paper Birch.
671	Pinus muricata	
605	Nyssa capitata	Ogeechee Lime; Sour Tupello.
639	Abies concolor	White Fir.
1004	Abies amabilis	
584	Osmanthus Americanus	Wild Olive; Devil Wood.
347	Symplocus tinctoria	Horse Sugar Sweet Leaf; Gum Wood.
1035	Populus tremuloides	Aspen; Quaking Asp.
260	Magnolia Fraseri	Long-Leaved Cucumber Tree.

TABLE 5.—AMERICAN WOODS—Continued.

DARK RED.

Number of specimen.	Botanical name.	Common na
458	Mimusops Sieberi	Nase Berry.
453	Coccoloba uvifera	Sea Grape.
485	Rhizophora Mangle	Mangrove.
473	Coccoloba Floridana	Pigeon Plum.
1112	Lysiloma latisiliqua	Wild Tamarind.
606	Prunus umbellata	Hog Plum.
657	Sequoia gigantea	Big Tree.
1253	Juniperus Virginiana	Red Cedar; Savin.
Heart 837	do	Do.
500	Diphotis salicifolia	Red Stopper; Cassada Bu
927	Prosopis juliflora algaroba	Meskit; Honey Locust.
463	Hypelate paniculata	Madura Wood; Honey Be
710	Sequoia sempervirens	Redwood.
662	Libocedrus decurrens	White Cedar.
642	Pseudotsuga Douglasi, var. macrocarpa	
692	Juniperus pachyphlœa	Cedar.
1017	Thuya gigantea	Red Cedar.
1102	Juniperus occidentalis, var. conjugens	Cedar.
368	Prunus serotina	Wild Cherry; Rum Cherr
326	Carya olivæformis	Pecan Nut.
1159	Washingtonia filifera	

LIGHT RED.

334	Prunus Americana	Wild Plum; Canada Plun
3.4	Ulmus crassifolia	Cedar Elm.
127	Prunus serotina	Wild Cherry; Rum Cherr
1113	Byrsonema lucida	Tallow Berry.
675	Cupressus macrocarpa	Monterey Cypress.
1062	Prunus Caroliniana	Mock Orange; Wild Olive
480	Chrysobalanus icaco	Coca Plum.
657	Sequoia gigantea	Big Tree.
770	Quercus Catesbæi	Turkey Oak; Scrub Oak.
414	Gordonia Lasianthus	
1118	Eugenia buxifolia	Stopper; Gurgeon Stoppe
960	Cornus Nuttallii	
239	Cratægus æstivalis	May Haw; Apple Haw.
767	Cratægus flava, var. pubescens	Haw.
1177	Salix petriolaris	
1158	Prunus ilicifolia	Islay.
241	Amelanchier Canadensis	June Berry; Shad Bush.
546	Liquidambar styraciflua	Liquid Amber; Sweet Gu
17	Quercus tinctoria	Black Oak; Quercitron Oa
444	Gleditschia triacanthos	Honey Locust.
687	Quercus densiflora	Chestnut Oak.
979	Alnus rhombifolia	
1033	Andromeda ferruginea	
877	Ostrya Virginica	Hop Hornbeam.
646	Populus Fremonti, var. Wealizeni	Cottonwood.
308	Fraxinus viridis	Green Ash.
756	Quercus laurifolia	Laurel Oak.
931	Quercus rubra, var. Texana	
685	Quercus Wislizeni	
663	Quercus agrifolia	
349	Quercus aquatica	Water Oak.
674	Quercus hypoleuca	
586	Myrica cerifera	Wax Myrtle.
341	Cyrilla racemiflora	Leather Wood.
426	Cratægus tomentosa	Black Thorn; Pear Thorn
435	Prunus Chicasa	Chickasaw Plum.
729	Castanopsis chrysophylla	Chinquapin Chestnut.
338	Cliftonia ligustrina	Iron Wood.
1093	Cratægus crus-galli	Cockspur Thorn.
1081	Cratægus subvillosa	Sweet Haw.

TABLE 5.—AMERICAN WOODS—Continued.

WHITE.

Number of specimen.	Botanical name.	Common name.
645	Negundo Californicum	Box Elder; Soft Maple.
737	Foresteria acuminata	
684	Æsculus Californica	Horse Chestnut; Buckeye.
754	Populus monelifera	Cottonwood.
1054	Populus balsamifera, var. candicans	
847	Populus grandidentata	Poplar.
889	Salix lasiandra, var. Fendleriana	
552	Populus angustifolia	
913	Pinus flexilis	White Pine.
408	Fraxinus quadrangulata	Blue Ash.
738	Halesia diptera	Snow Drop Tree.
791	Picea alba	White Spruce.
750	Nyssa sylvatica	Tupelo; Sour Gum; Pear Oak.
523	Abies Fraseri	
Sap 837	Juniperus Virginiana	Red Cedar; Savin.

OLIVE.

211	Asimina triloba	
1236	Liriodendron Tulipifera	Yellow Poplar; White Wood.
370	Viburnum Lentago	Sheep Berry.
479	Anona glabra	
1089	Cercis Canadensis	Red Bud; Judas Tree.
436	....do	Do.
474	Pisonia obtusa	
968	Prunus emarginata, var. mollis	Wild Cherry.
1178	Magnolia cordata	Cucumber Tree.

DRAB.

462	Bursera gummifera	West Indian Birch.
484	Ilex Dahoon	Dahoon Holly.
427	Æsculus glabra	Ohio Buckeye.
522	Populus heterophylla	Cotton Tree.
346	Magnolia grandiflora	Big Laurel.
487	Simarubra glauca	Bitter Wood; Paradise Tree.
532	Magnolia macrophylla	Large-Leaved Magnolia.
266	Magnolia Umbrella	Umbrella Tree.
280	Ilex opaca	American Holly.
73	Carpinus Caroliniana	Blue Beech; Hornbeam.

TABLE 5.—AMERICAN WOODS—Continued.

YELLOW.

Number of specimen.	Botanical name.	Common na
253	Maclura aurantiaca	Osage Orange.
466	Exostemma caribæum	
1140	Xantoxylum caribæum	Satin Wood; Yellow Woo
405	Robinia Pseudacacia	Locust; Yellow Locust.
1246	Morus rubra	Red Mulberry.
Sap. 1133	Guiacum sanctum	Lignum Vitæ.
678	Lemon color. Parkinsonia Torreyana	Palo Verde.
33	Lemon color. Cladrastis tinctoria	Yellow Wood.
Sap. 329	Sophora affinis	
845	Robinia Pseudacacia	Locust; Yellow Locust.
364	Fraxinus Americana, var. Texensis	Blue Ash.
475	Amyris sylvatica	Torch Wood.
1031	Robinia Mexicana	
994	Chamæcyparis Nutkænsis	Alaska Cedar; Yellow Ce
277	Torreya taxifolia	Stinking Cedar.
1124	Bumelia cuneata	Downward Plum.
1000	Chamæcyparis Nutkænsis	Alaska Cedar; Yellow Ce
333	Bumelia lycioides	Iron Wood; Southern Bu
928	Sapindus marginatus	
652	Celtis occidentalis, var. reticulata	
Sap. 1131	Canella alba	
910	Pinus ponderosa	Yellow Pine.
1086	Xanthoxylum herculis	Prickly Ash.
820	Abies subalpina	Balsam.
929	Ulmus crassifolia	Cedar Elm.
651	Torreya Californica	California Nutmeg.

YELLOWISH WHITE.

942	Ehretia elliptica	
604	Nyssa uniflora	Large Tupelo; Cotton G
1157	Pinus Coulteri	Bull Pine; Yellow Pine.
703	Umbellularia Californica	Myrtle.
377	Abies balsamea	Balsam Fir.
795	Larix Americana	Tamarack.
774	do	Do.
660	Fraxinus pistaciæfolia	
397	Pinus edulis	Pinon; Nut Pine.
1094	Rhamnus Caroliniana	
544	Pinus glabra	Spruce Pine.
321	Pinus pungens	Table Mountain Pine.
314	Ulmus racemosa	Rock Elm.
576	Pinus tuberculata	
741	Taxodium distichum	Cypress.
1046	Pinus rigida	Pitch Pine; Yellow Pine
746	Bumelia tenax	Black Haw.
410	Pirus sambucifolia	Mountain Ash.
691	Cupressus Goveniana	Monterey Cypress.
1169	Pinus inops	Jersey Pine; Scrub Pine
1076	Pinus resinosa	Red Pine; Norway Pine.
997	Pinus contorta	Scrub Pine.
394	Pinus Banksiana	Scrub Pine; Gray Pine.
1045	Fraxinus Americana	White Ash.
839	Fraxinus sambucifolia	Black Ash.
880	Picea nigra	Black Spruce; Red Spru
656	Pinus Parryana	
822	Picea Englemanni	Spruce.
88	Carya porcina	Pig Nut.
915	Pinus monophylla	Pinon; Nut Pine.
930	Bumelia lanuginosa	Prickly Ash; Gum Elast
373	Picea nigra	Black Spruce; Red Spru
625	Pinus contorta, var. Murrayana	
278	Pinus mitis	Yellow Pine.
306	Celtis occidentalis	Sugar Berry; False Elm.
311	Negundo aceroides	Box Elder; Ash-Leaved

TABLE 5.—AMERICAN WOODS—Continued.

WHITE.

Number of specimen.	Botanical name.	Common name.
645	Negundo Californicum	Box Elder; Soft Maple.
727	Foresteria acuminata	
684	Æsculus Californica	Horse Chestnut; Buckeye.
754	Populus monelifera	Cottonwood.
1064	Populus balsamifera, var. candicans	
847	Populus grandidentata	Poplar.
880	Salix lasiandra, var. Fendleriana	
552	Populus angustifolia	
913	Pinus flexilis	White Pine.
408	Fraxinus quadrangulata	Blue Ash.
738	Halesia diptera	Snow Drop Tree.
791	Picea alba	White Spruce.
750	Nyssa sylvatica	Tupelo; Sour Gum; Pear Oak.
523	Abies Fraseri	
Sap 837	Juniperus Virginiana	Red Cedar; Savin.

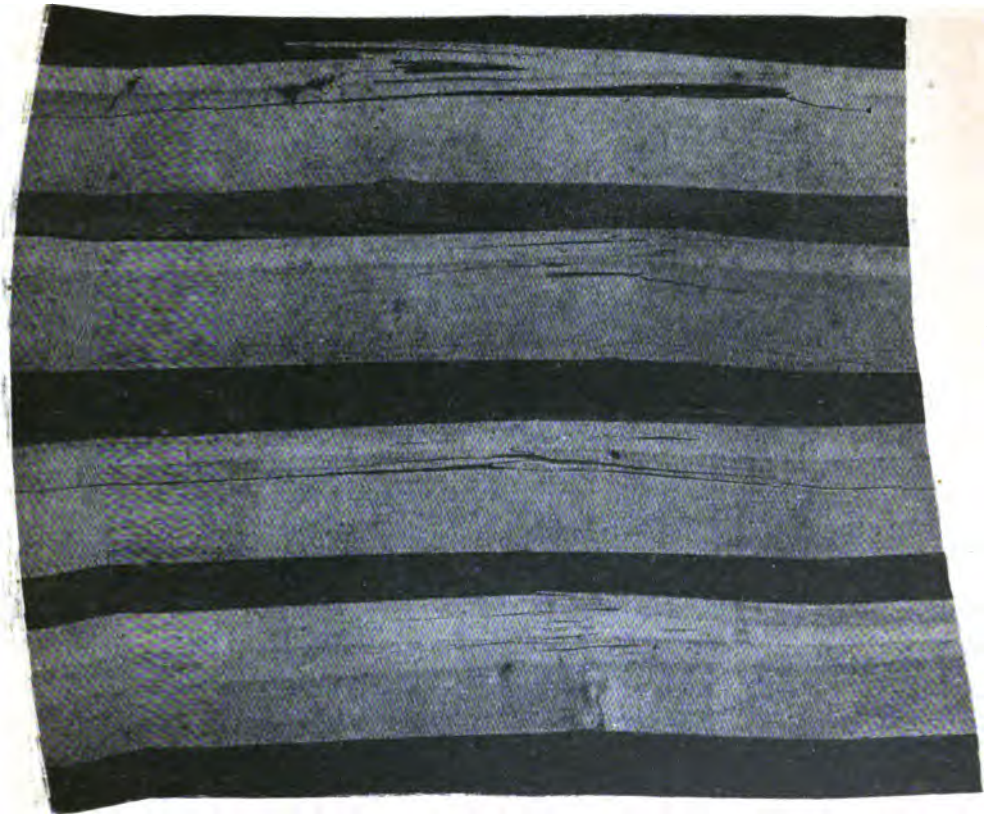
OLIVE.

211	Asimina triloba	
1286	Liriodendron Tulipifera	Yellow Poplar; White Wood.
370	Viburnum Lentago	Sheep Berry.
479	Anona glabra	
1089	Cercis Canadensis	Red Bud; Judas Tree.
436	....do	Do.
474	Pisonia obtusa	
988	Prunus emarginata, var. mollis	Wild Cherry.
1178	Magnolia cordata	Cucumber Tree.

DRAB.

62	Bursera gummifera	West Indian Birch.
84	Ilex Dahoon	Dahoon Holly.
27	Æsculus glabra	Ohio Buckeye.
22	Populus heterophylla	Cotton Tree.
46	Magnolia grandiflora	Big Laurel.
87	Simarubra glauca	Bitter Wood; Paradise Tree.
32	Magnolia macrophylla	Large-Leaved Magnolia.
66	Magnolia Umbrella	Umbrella Tree.
30	Ilex opaca	American Holly.
73	Carpinus Caroliniana	Blue Beech; Hornbeam.

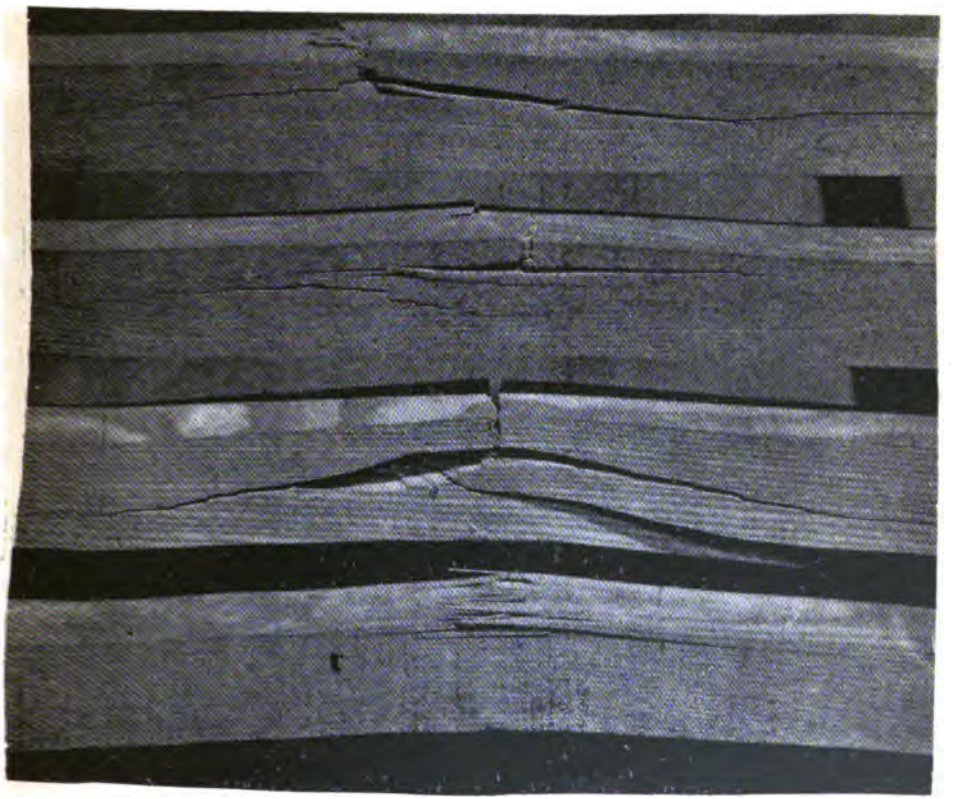
PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.



No.	*Botanical Name.*	*Common Name.*
878b.	Acer rubrum	Red maple, Swamp maple.
849a.	Amelanchier Canadensis.	June Berry, Shad bush, Service berry.
4.	Betula lenta	Cherry Birch, River Birch.
1068b.	" lutea	Yellow Birch.

S. Ex. 5, 1, 48.

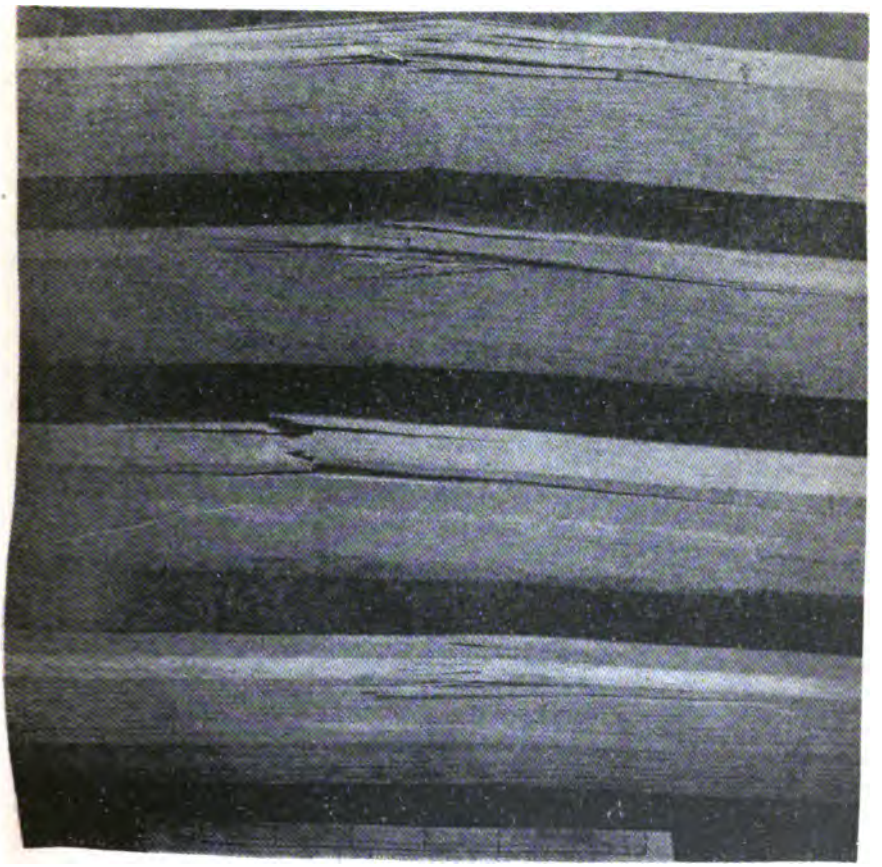
PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.



No.	*Botanical Name.*	*Common Name.*
431.	Fraxinus Americana	White Ash.
291.	" quadrangulata	Blue Ash.
1059.	" pubescens	Red Ash.
1045.	" Americana	White Ash.

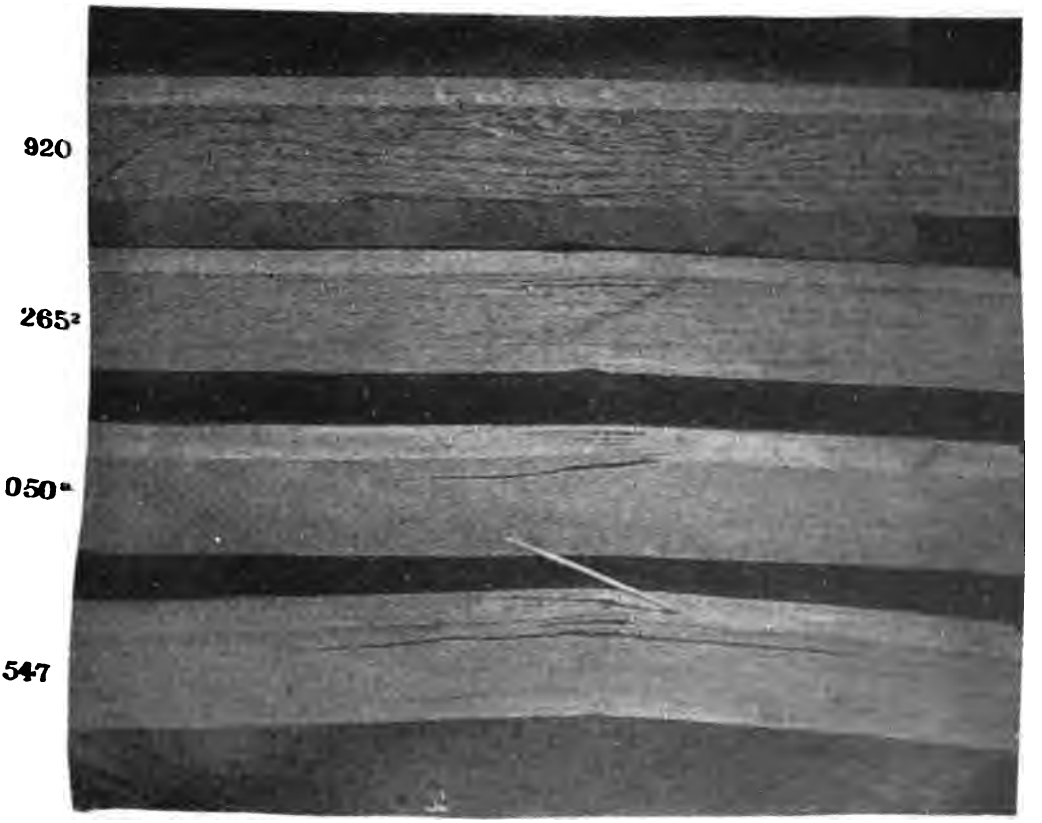
S. Ex. 5, 1, 48.

PHOTOGRAPHS OF TRANSVERSE FRACTURES OF AMERICAN WOODS.



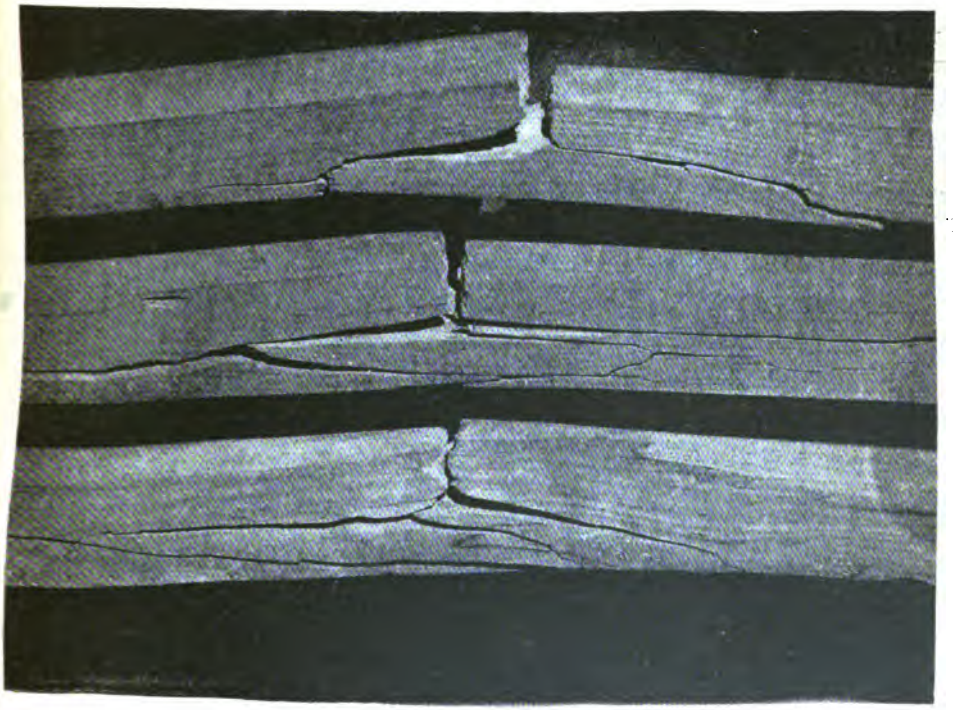
No.	*Botanical Name.*	*Common Name.*
249[b].	Carya Alba.	Shellbark Hickory.
531[c].	" "	" "
1168[b].	" porcina.	Pig nut.
1164[b].	" sulcata.	

PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.

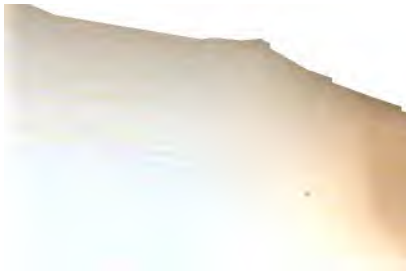


No.	*Botanical Name.*	*Common Name.*
920.	Quercus rubra	Red Oak.
265a.	" falcata	Spanish Oak, Red Oak.
1050a.	" alba	White Oak.
547.	" "	" "

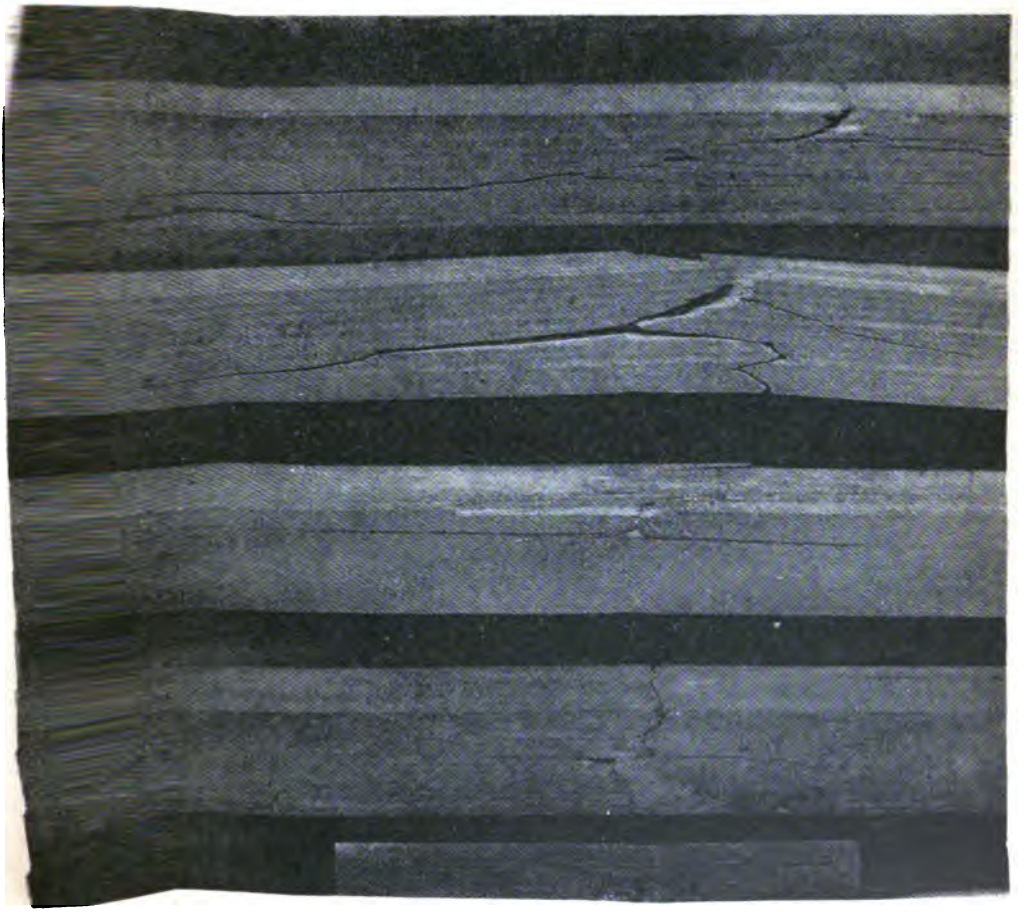
PHOTOGRAPHS OF TRANSVERSE FRACTURES OF AMERICAN WOODS.



No.	*Botanical Name.*	*Common Name.*
651[a].	Torreya Californica	California Nutmeg.
692[b].	Juniperus pachyphlœa	Cedar.
691[b].	Cupressus Goveniana	



PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.



No.	*Botanical Name.*	*Common Name.*
800[b]	Juniperus Virginiana	Red Cedar.
701	Chamæcyparis Lawsoniana	Post Oxford cedar.
707[b]	" "	" " "
712[b]	Sequoia sempervireus	Redwood.

PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.

No.	*Botanical Name.*	*Common Name.*
1016[b].	Pseudotsuga Douglasii	Red Fir, Yellow fir.
1020[b].	" "	" "
1008[a].	" "	" "
1008[b].		

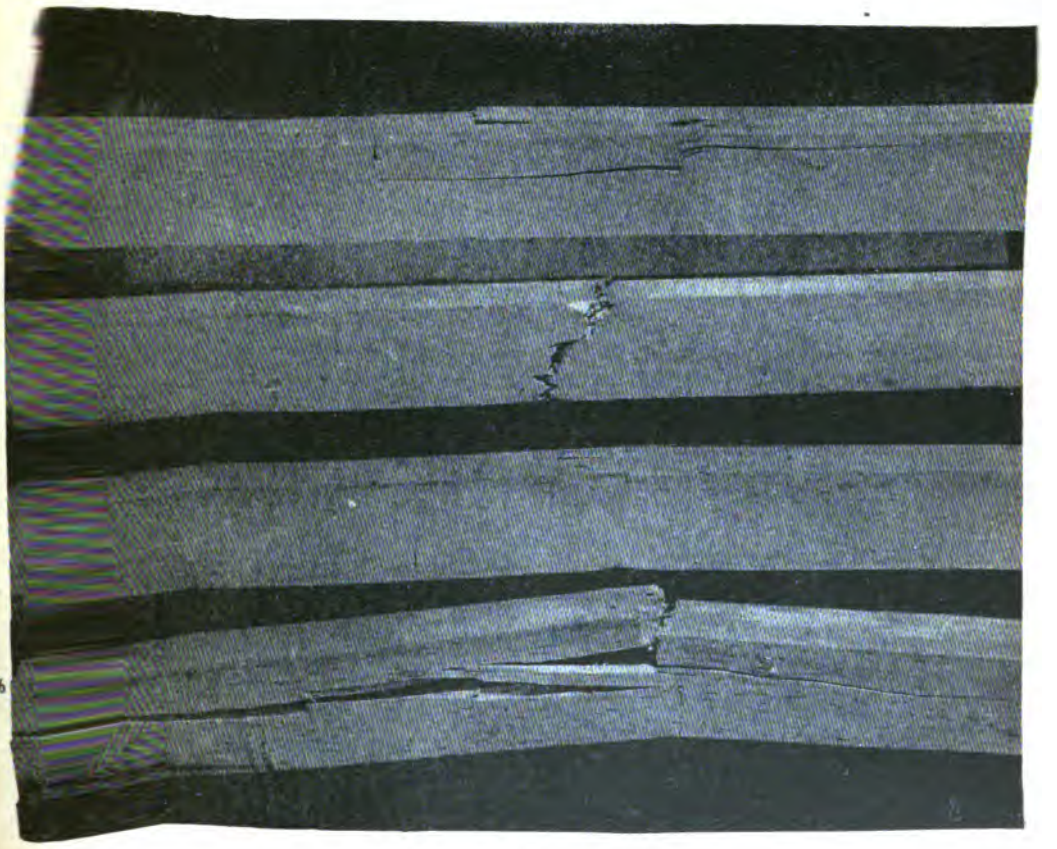
S. Ex. 5, 1, 48.

PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.

No.	*Botanical Name.*	*Common Name*
984[b].	Larix occidentallis	
292[a].	Picea Engelmanni	Spruce.
1040[b].	Tsuga Canadensis	Hemlock
722[b];	" "	"

S. Ex. 5, 1. 48.

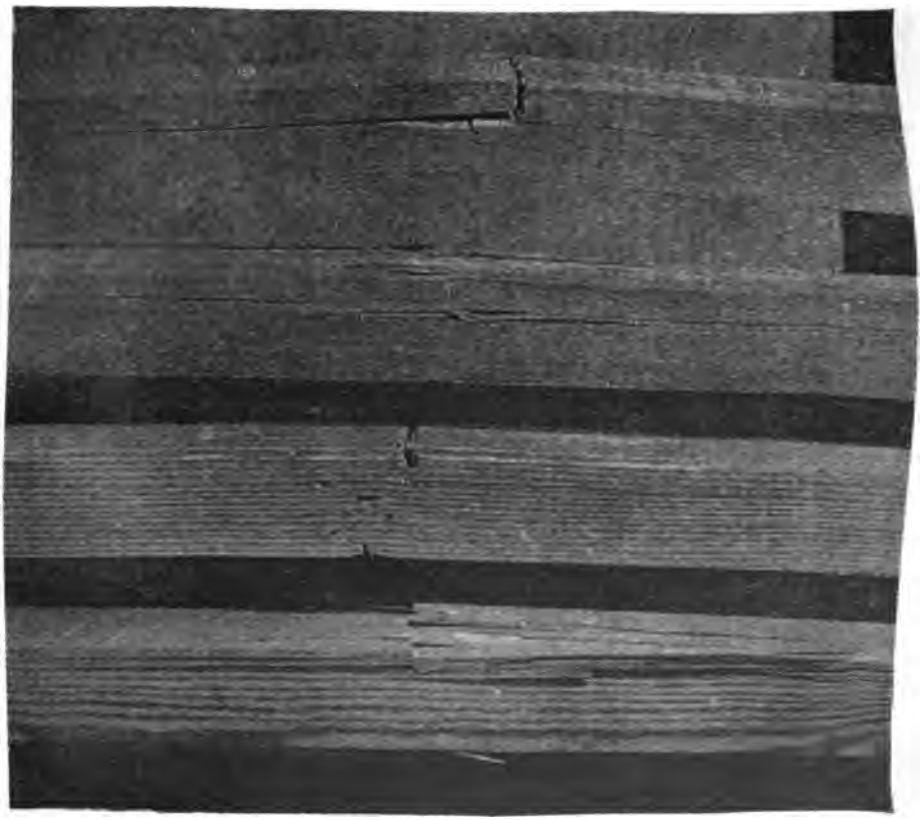
PHOTOGRAPHS OF TRANSVERSE FRACTURES OF AMERICAN WOODS.



No.	Botanical Name.	Common Name.
777.	Pinus Strobus	White pine.
789.	" "	" "
975a.	" monticola	" "
819b.	" flexilis	" "

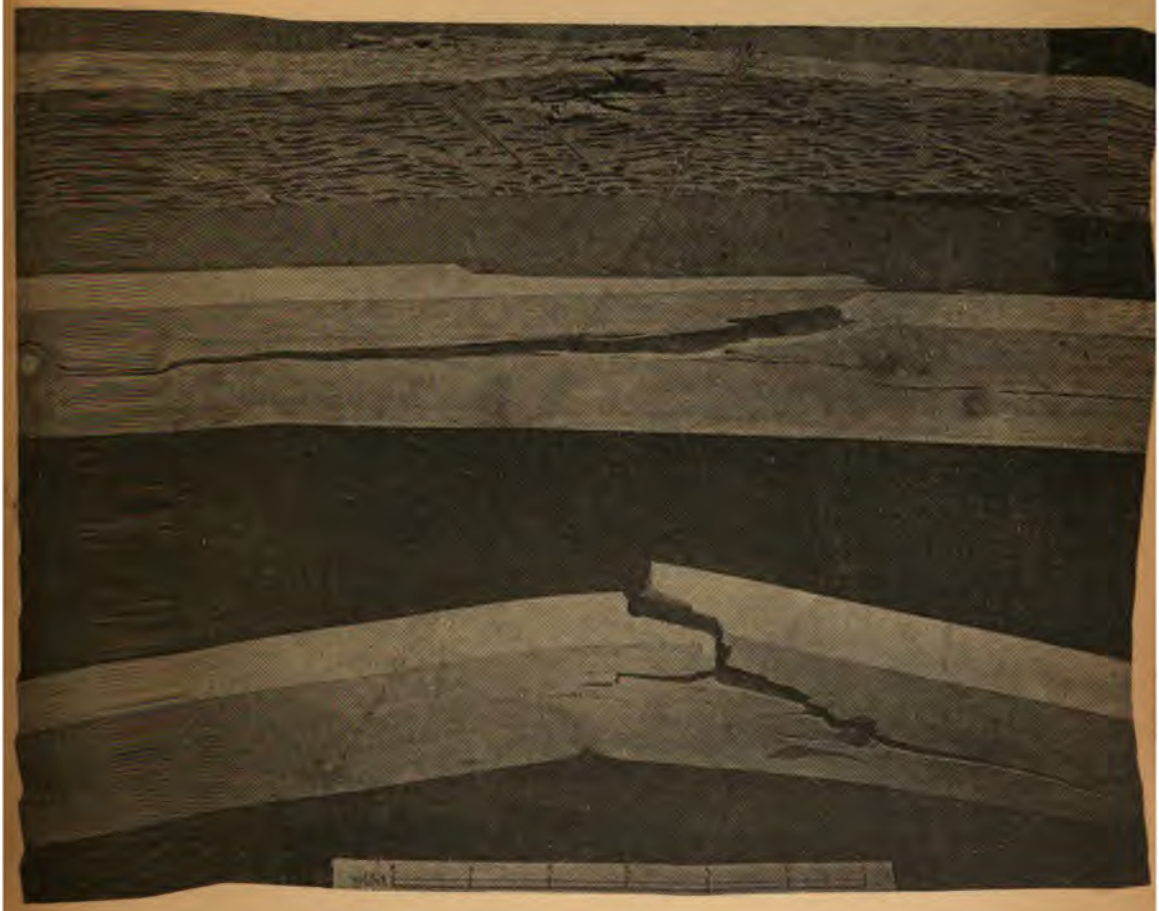
S. Ex. 5, 1, 48.

PHOTOGRAPHS OF TRANSVERSE FRACTURES OF AMERICAN WOODS.



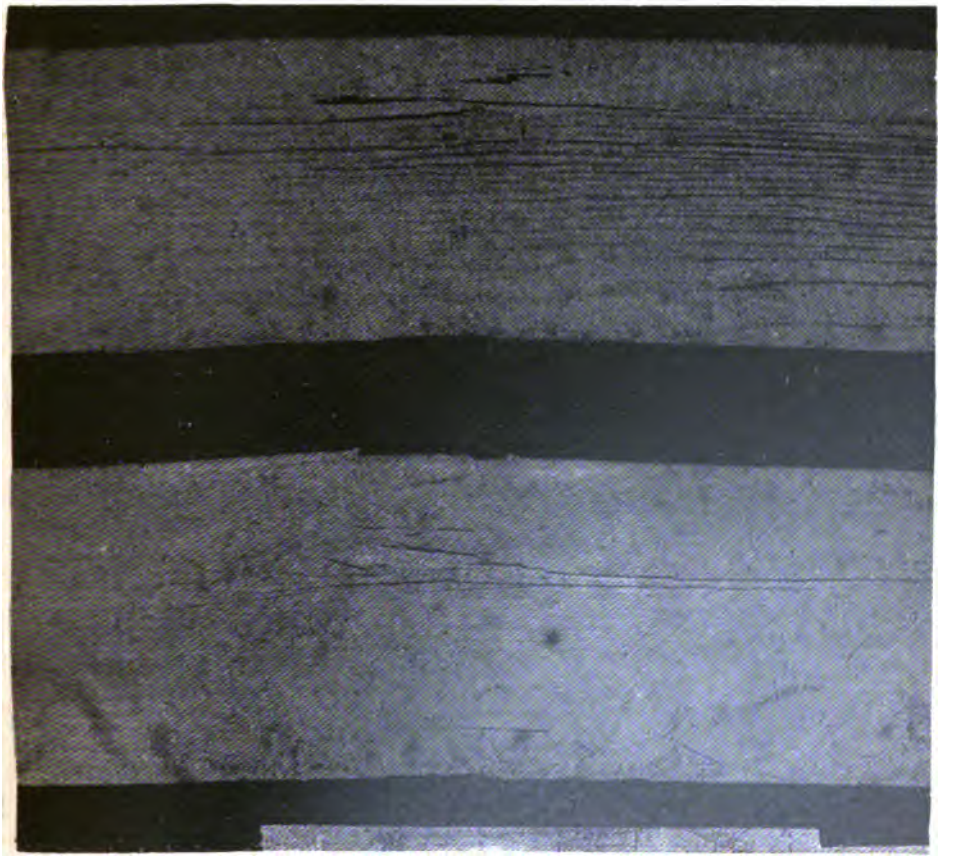
No.	*Botanical Name.*	*Common Name.*
81[b].	Pinus palustris	Long-leaved pine, Southern pine.
81[d].	" "	" " " "
358[a].	" "	" " " "
358[b].	" "	" " " "

PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.



No-	*Botanical Name.*	*Common Name.*
1159.	Washingtonia filifera	
286-	Fraxinus quadrangulata	Blue Ash
889.	Salix lasiandra var Fendleriana	

PHOTOGRAPHS OF TRANSVERSE FRACTURES
OF
AMERICAN WOODS.



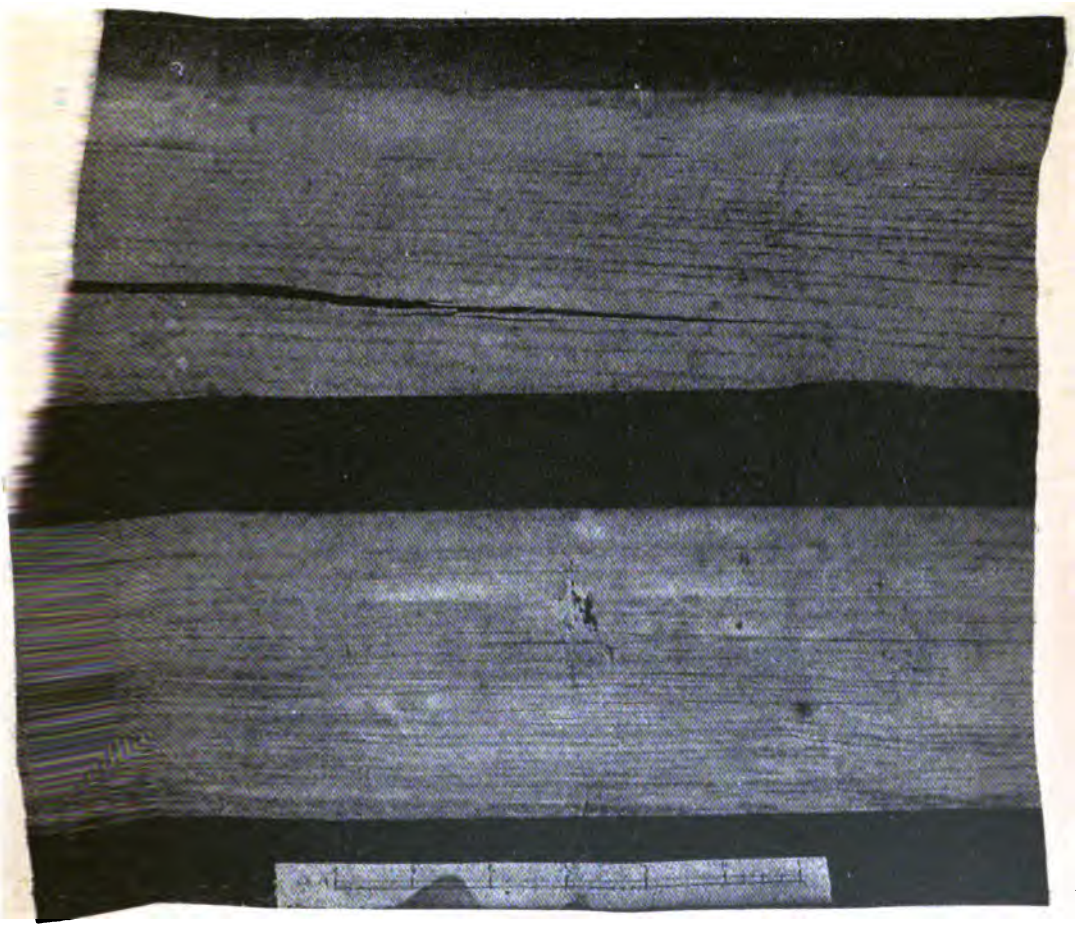
No.	*Botanical Name.*	*Common Name.*
524.	Quercus Michauxii	Basket Oak, Cow Oak.
19.	Ulmus Americana	White Elm, Water Elm.

S. Ex. 5, 1, 48.

PHOTOGRAPHS OF TRANSVERSE FRACTURES

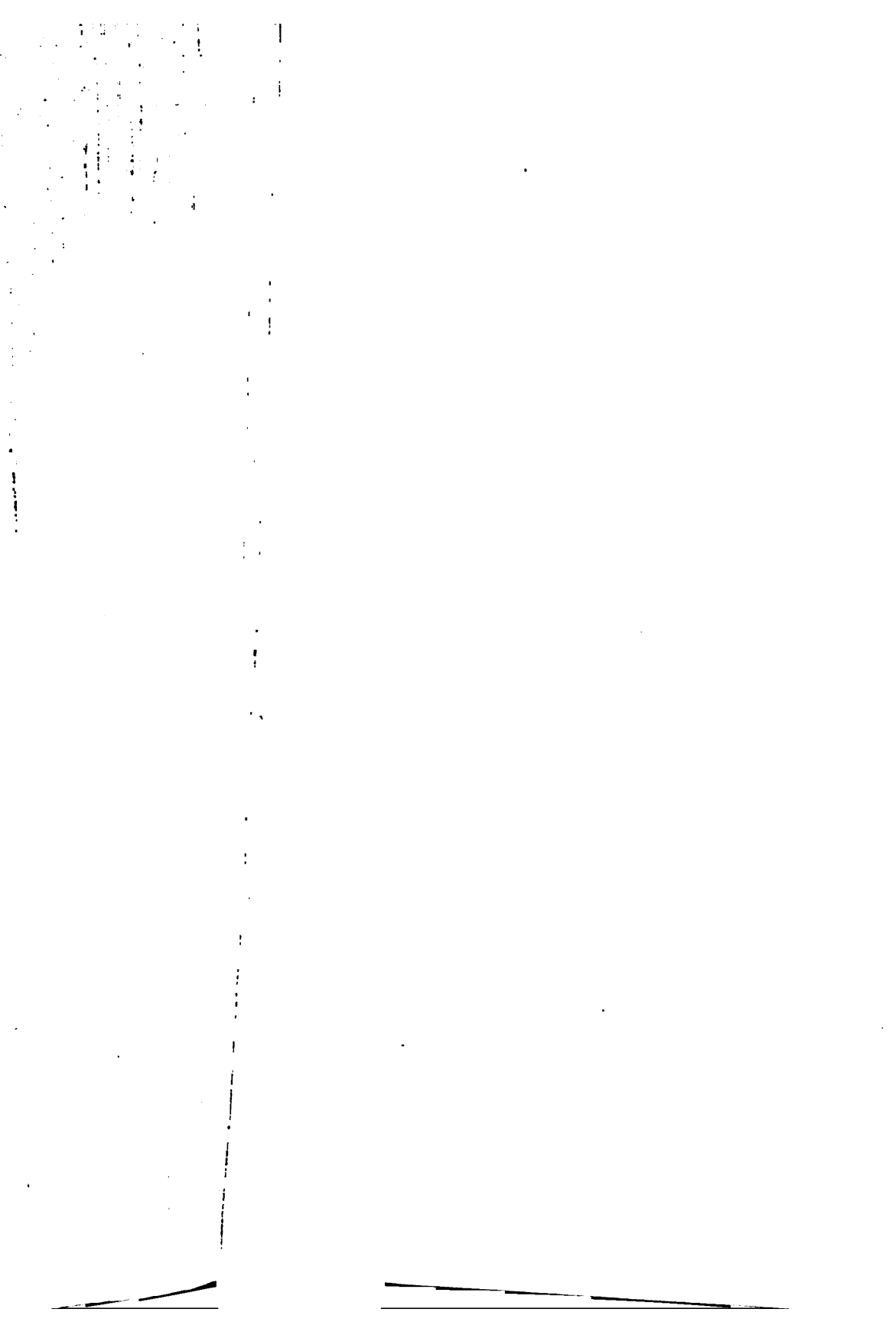
OF

AMERICAN WOODS.



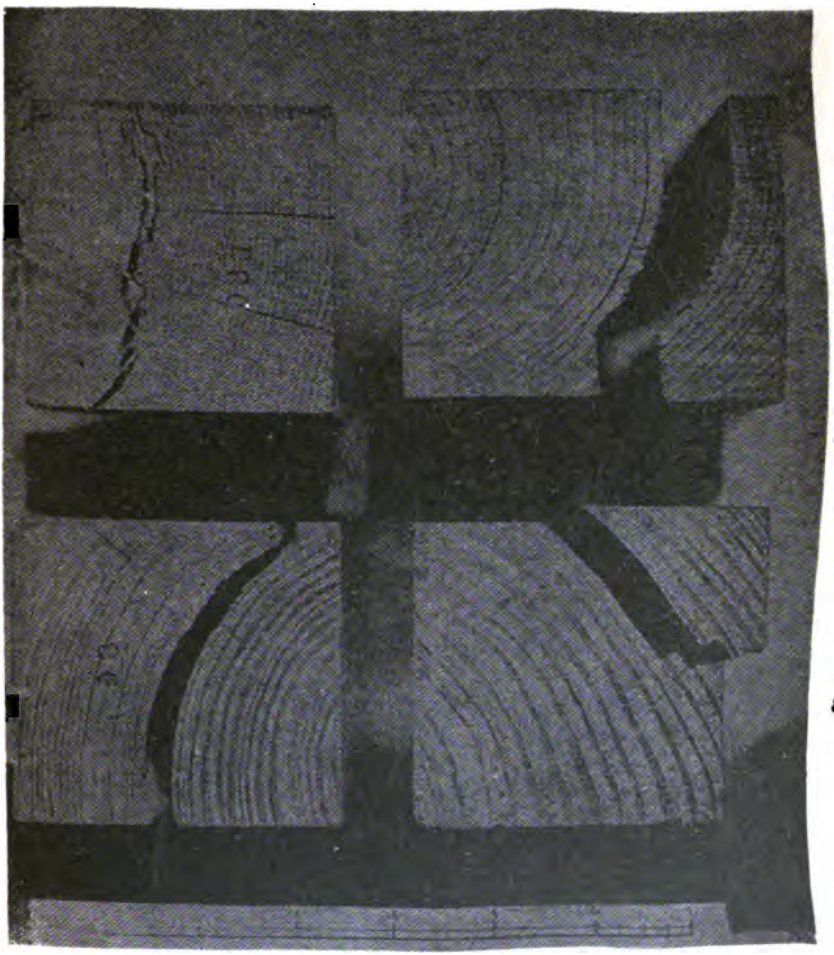
No.	*Botanical Name.*	*Common Name.*
38².	Catalpa speciosa	Western Catalpa.
81.	Pinus palustris	Long-leaved pine, Southern pine.

S. Ex. 5, 1, 48.



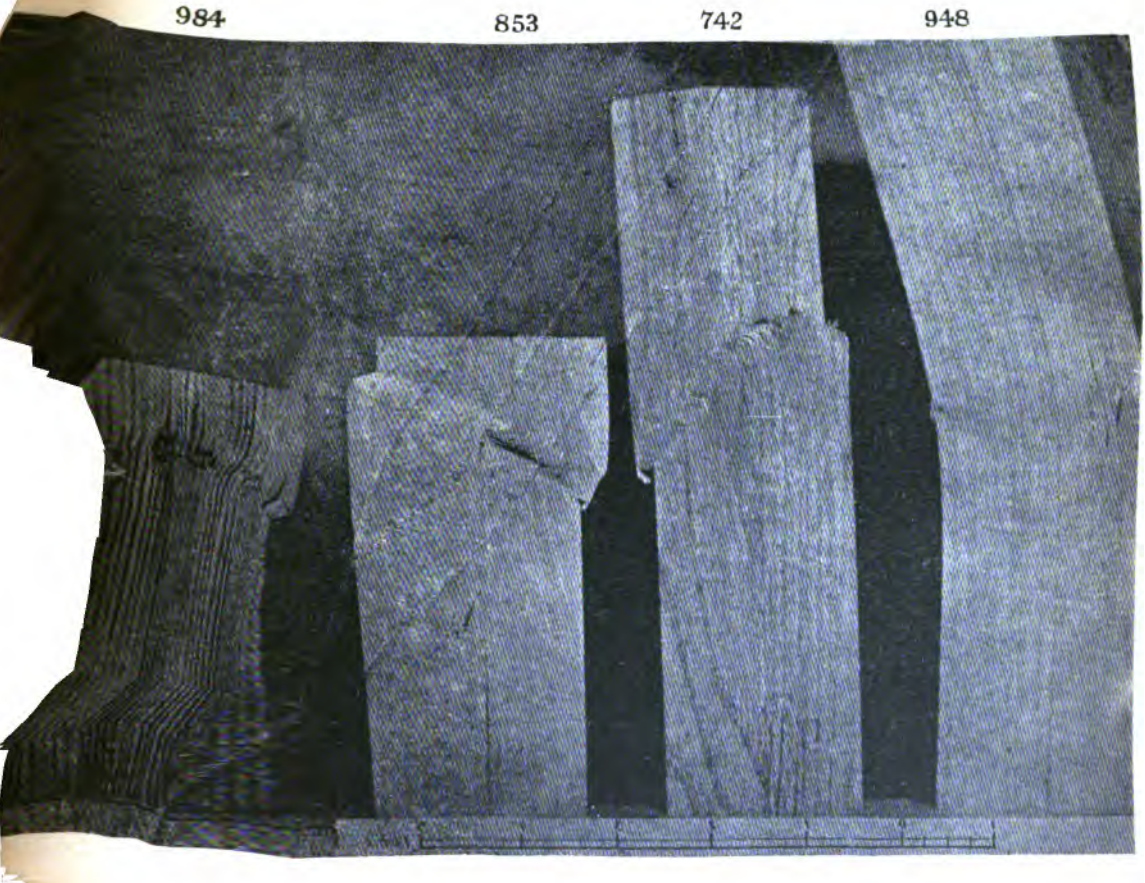
END VIEWS.

PHOTOGRAPHS OF TRANSVERSE FRACTURES OF AMERICAN WOODS.



No.	*Botanical Name.*	*Common Name.*
38x.	Catalpa Speciosa	Western Catalpa.
925.	Quercus Prinus	Chestnut Oak.
82y.	Pinus Tæda	Loblolly pine, Old field pine
84.	Pinus Cubensis	Slash pine, Bastard pine.

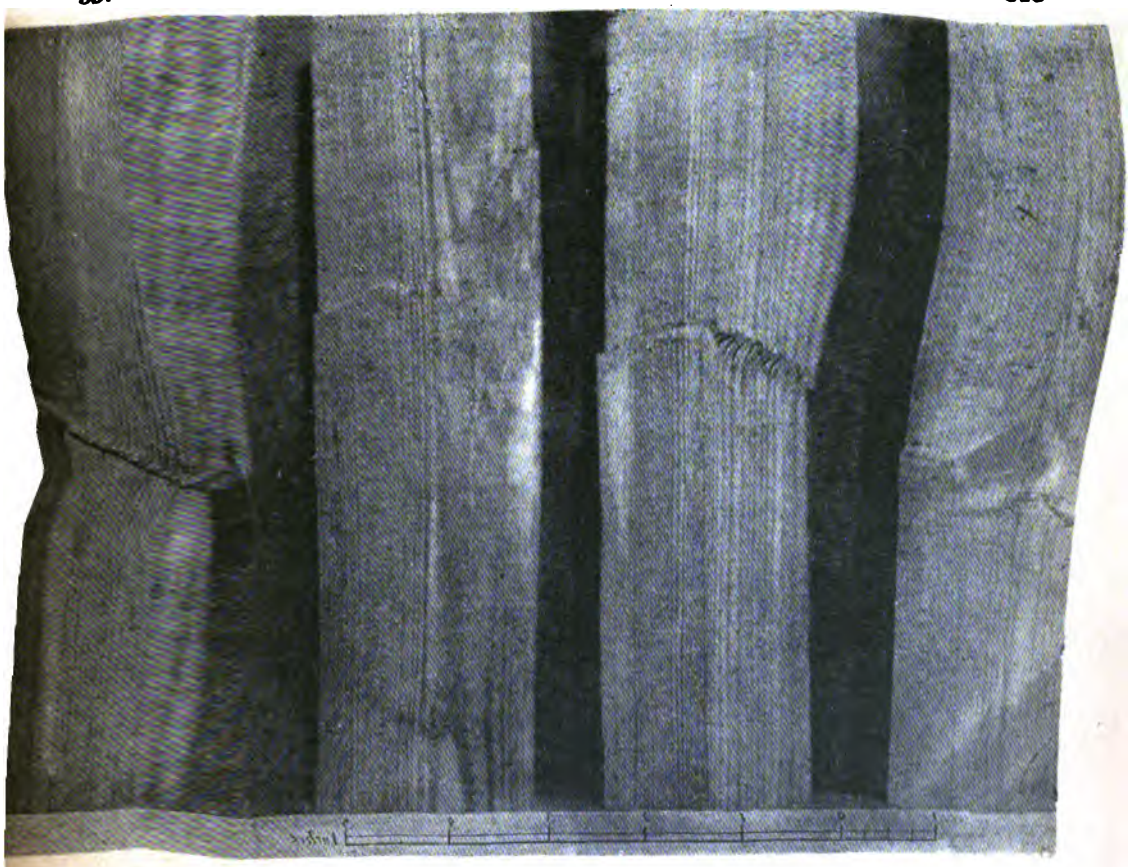
PHOTOGRAPHS OF COMPRESSION FRACTURES OF AMERICAN WOODS.



No.	*Botanical Name.*	*Common Name.*
948.	Fraxinus Viridis	Green Ash.
742.	Quercus aquatica	Water Oak.
853.	Fagus ferruginea	Beech.
984.	Larix occidentallis	

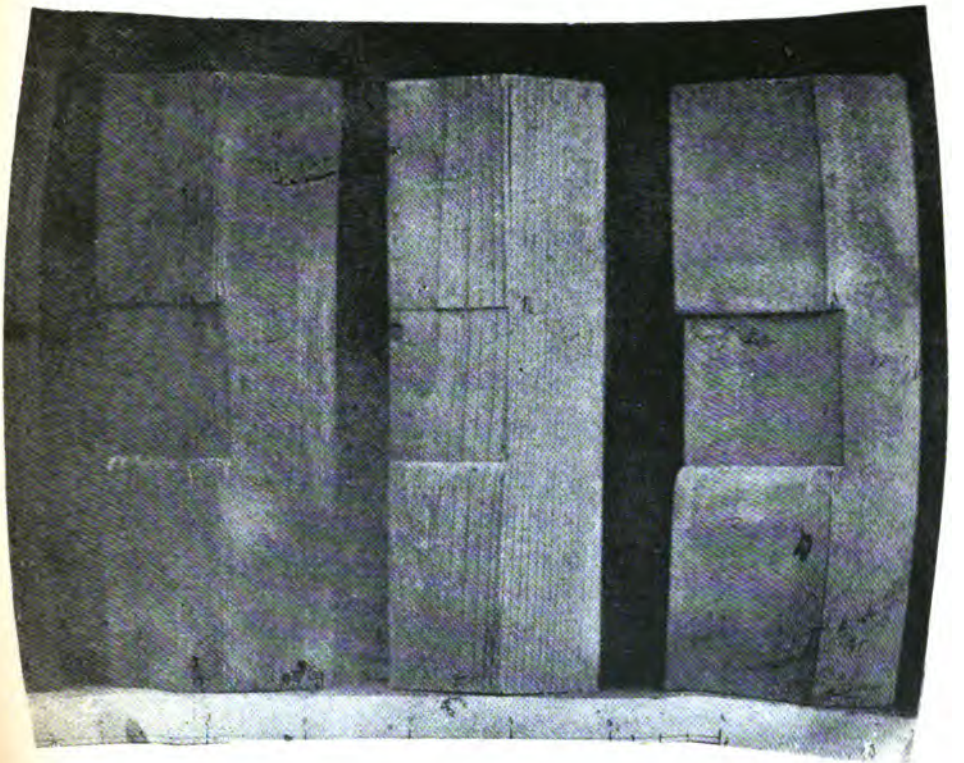
PHOTOGRAPHS OF COMPRESSION FRACTURES OF AMERICAN WOODS.

357 356 786 513



No.	*Botanical Name.*	*Common Name.*
513.	Picea alba	White spruce.
786.	Larix Americana	Tamarack.
356.	Pinus Cubensis	Slash pine, Bastard pine.
357.	Pinus palustris	Long-leaved pine, Southern pine.

PHOTOGRAPHS OF INDENTATION SPECIMENS, AMERICAN WOODS.



No. 535. No. 377. No. 280.

No.	*Botanical Name.*	*Common Name.*
280.	Ilex opaca	American Holly.
377.	Abies balsamea	Balsam fir.
535.	Taxodium distichum	Cypress.

PRIVATE TESTS FROM JULY 1, 1882, *TO JUNE* 30, 1883.

Date of test.	No. of test.	Material.	For whom tested.
1882.			
July 1	1976	Wrought iron	Lloyd & Symes.
1	1977	....do	Do.
1	1978	....do	Do.
1	1979	....do	Do.
1	1980	....do	Do.
1	1981	....do	Do.
1	1982	....do	Do.
5	1983	Steel	Farist & Windsor.
5	1984	....do	Do.
5	1985	Wrought-iron eye-bar	Kellogg & Maurice.
6	1986	....do	Do.
6	1987	....do	Do.
6	1988	....do	Do.
19	2524	Malleable casting	McConway & Torley.
19	2525	Wrought-iron turn-buckle	Providence Tool Company.
19	2526	....do	Do.
19	2527	....do	Do.
22	2528	Wrought iron	New York and New England Railroad.
22	2529	....do	Do.
22	2530	....do	Do.
22	2531	....do	Do.
22	2532	....do	Do.
22	2533	....do	Do.
31	2534	Steel eye-bar	George S. Morison.
Aug. 1	2535	....do	Do.
2	2536	O. H. steel	Lloyd & Symes.
2	2537	....do	Do.
2	2538	Wrought-iron riveted joint	H. S. Robinson.
2	2539	....do	Do.
2	2540	....do	Do.
2	2541	....do	Do.
3	2542	....do	Do.
3	2543	....do	Do.
3	2544	....do	Do.
3	2545	Steel riveted joint	Do.
3	2546	Wrought-iron plate	Do.
3	2547	....do	Do.
3	2548	Steel plate	Do.
3	2549	....do	Do.
21	2550	Lee marble	City of Philadelphia.
21	2551	....do	Do.
21	2552	Pennsylvania blue marble	Do.
21	2554	....do	Do.
21	2555	Hummelstown sandstone	Do.
21	2556	....do	Do.
21	2557	Bostard limestone	Do.
21	2558	....do	Do.
21	2559	Dobbins brick	Do.
21	2560	Excelsior brick	Do.
21	2561	J. R. Huhn brick	Do.
21	2562	Dotterer brick	Do.
21	2563	Ohio sandstone	Do.
21	2564	....do	Do.
22	2565	Lee marble	Do.
22	2566	....do	Do.
22	2567	....do	Do.
22	2568	....do	Do.
22	2569	Pennsylvania blue marble	Do.
22	2570	....do	Do.
22	2571	....do	Do.
22	2572	....do	Do.
22	2573	Ohio sandstone	Do.
22	2574	....do	Do.
22	2575	Indiana limestone	Do.
22	2576	....do	Do.
22	2577	....do	Do.
22	2578	....do	Do.
22	2579	Vermont marble	Do.
22	2580	....do	Do.
22	2581	Ohio sandstone	Do.
22	2582	....do	Do.
22	2583	....do	Do.

PRIVATE TESTS FROM JULY 1, 1882, *TO JUNE* 30, 1883—Co

Date of test.	No. of test.	Material.	For whom te
1882.			
Aug. 22	2584	Ohio sandstone	City of Philadelphia.
22	2585	Hummelstown sandstone	Do.
23	2586	....do	Do.
23	2587	Dobbins brick	Do.
23	2588	....do	Do.
23	2589	Excelsior brick	Do.
23	2590	....do	Do.
23	2591	J. R. Huhn brick	Do.
23	2592	....do	Do.
23	2593	....do	Do.
23	2594	....do	Do.
23	2595	Dotterer brick	Do.
23	2596	....do	Do.
25	2597	Cast iron	Do.
25	2598	....do	Do.
25	2599	....do	Do.
25	2600	Wrought-iron I-beam	Do.
26	2601	....do	Do.
26	2602	....do	Do.
28	2603	Wrought-iron plate	Salem Water Works.
28	2604	....do	Do.
29	2605	Steel eye-bar	George S. Morison.
Sept. 5	2606	Wrought-iron column	C. Shaler Smith.
6	2607	Red sandstone	E. D. Leavitt, jr.
6	2608	White sandstone	Do.
6	2609	Wrought iron	City of Lowell.
6	2610	....do	Do.
6	2611	....do	Do.
6	2612	Wrought-iron rivet	Do.
6	2613	....do	Do.
6	2614	....do	Do.
6	2615	....do	Do.
6	2616	....do	Do.
6	2617	....do	Do.
6	2618	....do	Do.
6	2619	....do	Do.
8	2620	Wrought iron	Grand Trunk Railway.
8	2621	....do	Do.
15	2623	....do	W. & A. Fletcher.
15	2624	....do	Do.
15	2625	....do	Do.
15	2626	....do	Do.
15	2627	....do	Do.
15	2628	....do	Do.
20	2629	Wrought-iron eye-bar	New Jersey Steel and I
20	2630	....do	Do.
20	2631	....do	Do.
28	2632	Sheet rubber	George A. Baker.
Oct. 3	2633	Composition ring	South Boston Iron Com
3	2634	....do	Do.
3	2635	....do	Do.
11	2636	Elevator safety-catch	F. P. Canfield.
16	2662	Wrought iron	Boston Bridge Works.
16	2663	....do	Do.
16	2664	....do	Do.
16	2665	....do	Do.
16	2666	....do	Do.
16	2667	....do	Do.
16	2668	....do	Do.
16	2669	....do	Do.
28	2670	Saab chain	Smith and Egge Man pany.
28	2671	....do	Do.
28	2672	....do	Do.
28	2673	....do	Do.
28	2674	....do	Do.
28	2675	....do	Do.
28	2676	....do	Do.
28	2677	....do	Do.
28	2678	....do	Do.
28	2679	....do	Do.
28	2680	....do	Do.
30	2681 *a*	Wrought-iron plate	Boston and Albany Rai
30	2681 *b*	....do	Do.
30	2682	Wrought-iron eye-bar	New Jersey Steel and I
30	2683	....do	Do.
30	2684	....do	Do.
31	2685	Wrought iron	City of Lowell.
31	2686	....do	Do.

PRIVATE TESTS FROM JULY 1, 1882, TO JUNE 30, 1883—Continued.

Date of test.	No. of test.	Material.	For whom tested.
1882.			
Oct. 31	2687	Wrought iron	City of Lowell.
31	2688	....do	Do.
31	2689	....do	Do.
31	2690	....do	Do.
31	2691	....do	Do.
Nov. 1	2696	Bluestone	E. Fritsch.
1	2697	....do	Do.
1	2698	Slate	Do.
1	2699	....do	Do.
1	2700	Bluestone	Do.
1	2701	Slate	Do.
6	2702	Wrought-iron eye-bar	Haugh, Ketcham & Co.
6	2703	....do	Do.
6	2704	....do	Do.
6	2705	....do	Do.
6	2706	....do	Do.
6	2707	....do	Do.
6	2708	....do	Do.
6	2709	....do	Do.
6	2710	....do	Do.
6	2711	....do	Do.
6	2712	....do	Do.
6	2713	....do	Do.
6	2714	....do	Do.
6	2715	....do	Do.
6	2716	....do	Do.
6	2717	....do	Do.
6	2718	....do	Do.
6	2719	....do	Do.
6	2720	....do	Do.
6	2721	....do	Do.
6	2722	....do	Do.
6	2723	....do	Do.
7	2724	....do	Do.
7	2725	....do	Do.
11	2726	Galvanized wrought-iron wire	B. F. Saunders.
11	2727	....do	Do.
11	2728	....do	Do.
11	2729	....do	Do.
11	2730	....do	Do.
11	2731	Galvanized steel wire	Do.
11	2732	....do	Do.
11	2733	....do	Do.
11	2734	....do	Do.
11	2735	Elevator safety catch	F. P. Canfield.
11	2736	Railroad spring	Do.
24	2737	Steel-wire rope	J. A. Roebling's Sons' Company.
28	2738	Granite	Milford Granite Company.
28	2739	....do	Do.
Dec. 5	2740	Car spring	F. P. Canfield.
6	2741	Rubber disk	George A. Baker.
6	2742	....do	Do.
6	2743	....do	Do.
6	2744	....do	Do.
22	2745	Wrought-iron riveted joint	Rhode Island Locomotive Works.
22	2746	....do	Do.
22	2747	....do	Do.
26	2748	Rubber disk	George A. Baker.
26	2749	....do	Do.
26	2750	....do	Do.
26	2751	....do	Do.
26	2752	....do	Do.
26	2753	Wrought iron	A. G. Tompkins & Co.
26	2754	....do	Do.
26	2755	....do	Do.
26	2756	....do	Do.
26	2757	....do	Do.
26	2758	....do	Do.
26	2759	....do	Do.
26	2760	....do	Do.
26	2761	....do	Do.
26	2762	....do	Do.
26	2763	....do	Do.
26	2764	....do	Do.
26	2765	....do	Do.
26	2766	....do	Do.
26	2767	....do	Do.
1883. Jan. 4	2768	Wrought iron	McClure & Field.

PRIVATE TESTS FROM JULY 1, 1882, TO JUNE 30, 1883—Co

Date of test.	No. of test.	Material.	For whom te
1883.			
Jan. 4	2769	Wrought iron	McClure & Field.
4	2770	do	Do.
5	2771	Old oak post	Pacific Mills.
6	2772	do	Do.
6	2773	do	Do.
6	2774	do	Do.
6	2775	do	Do.
6	2776	do	Do.
6	2777	do	Do.
6	2778	do	Do.
8	2779	Wrought-iron eye-bar	Cofrode & Saylor.
8	2780	do	Do.
8	2781	do	Do.
9	2782	Wrought iron; boiler plate	Philadelphia Water De
9	2783	do	Do.
9	2784	do	Do.
9	2785	do	Do.
9	2786	do	Do.
9	2787	do	Do.
9	2788	do	Do.
9	2789	do	Do.
9	2790	do	Do.
24	2791	Wrought-iron rivet	City of Lowell.
24	2792	do	Do.
24	2793	do	Do.
24	2794	do	Do.
24	2795	do	Do.
24	2796	do	Do.
24	2797	Wrought-iron bar	Do.
24	2798	do	Do.
24	2799	do	Do.
24	2800	do	Do.
24	2801	do	Do.
24	2802	do	Do.
24	2803	do	Do.
24	2804	do	Do.
25	2805	Loop-welded eye-bar	Do.
25	2806	do	Do.
25	2807	do	Do.
25	2808	do	Do.
25	2809	do	Do.
25	2810	do	Do.
25	2811	Wrought-iron eye-bar	Do.
26	2812	do	Do.
26	2813	do	Do.
26	2814	do	Do.
26	2815	do	Do.
27	2816	do	Do.
29	2817	Wrought-iron bar	Do.
29	2818	do	Do.
29	2819	do	Do.
29	2820	do	Do.
29	2821	do	Do.
29	2822	Wrought-iron plate	Do.
29	2823	do	Do.
29	2824	do	Do.
29	2825	do	Do.
29	2826	do	Do.
29	2827	do	Do.
29	2828	do	Do.
29	2829	Wrought-iron rivet	Do.
29	2830	do	Do.
29	2831	do	Do.
29	2832	do	Do.
29	2833	do	Do.
29	2834	do	Do.
29	2835	do	Do.
29	2836	do	Do.
29	2837	do	Do.
29	2838	do	Do.
29	2839	do	Do.
29	2840	do	Do.
30	2841	Stay bolt, iron	Lloyd & Symes.
30	2842	do	Do.
30	2843	do	Do.
Feb. 6	2844	Wrought iron	J. B. & J. M. Cornell.
6	2845	do	Do.
6	2846	do	Do.
6	2847	do	Do.

PRIVATE TESTS FROM JULY 1, 1882, *TO JUNE* 30, 1883—Continued.

Date of test.	No. of test.	Material.	For whom tested.
1883.			
Feb. 6	2848	Wrought iron	J. B. & J. M. Cornell.
9	2849	Wrought-iron eye-bar, with sleeve nut	City of Lowell.
9	2850	....do	Do.
9	2851	....do	Do.
9	2852	....do	Do.
9	2853	....do	Do.
9	2854	....do	Do.
9	2855	....do	Do.
9	2856	....do	Do.
9	2857	....do	Do.
9	2858	....do	Do.
9	2859	....do	Do.
9	2860	....do	Do.
9	2861	....do	Do.
9	2862	....do	Do.
9	2863	....do	Do.
9	2864	....do	Do.
9	2865	....do	Do.
9	2866	....do	Do.
9	2867	....do	Do.
9	2868	....do	Do.
9	2869	....do	Do.
9	2870	....do	Do.
9	2871	....do	Do.
9	2872	....do	Do.
9	2873	....do	Do.
10	2874	....do	Do.
10	2875	....do	Do.
10	2876	....do	Do.
10	2877	....do	Do.
10	2878	....do	Do.
10	2879	....do	Do.
10	2880	Loop-welded eye-bar	Do.
10	2881	....do	Do.
10	2882	....do	Do.
10	2883	....do	Do.
10	2884	....do	Do.
10	2885	....do	Do.
10	2886	....do	Do.
10	2887	....do	Do.
10	2888	....do	Do.
10	2889	....do	Do.
10	2890	....do	Do.
10	2891	....do	Do.
10	2892	....do	Do.
10	2893	....do	Do.
10	2894	....do	Do.
10	2895	....do	Do.
10	2896	....do	Do.
12	2897	Steel eye-bar	Albert F. Hill.
12	2898	....do	Do.
12	2899	....do	Do.
12	2900	....do	Do.
12	2901	....do	Do.
12	2902	....do	Do.
12	2903	Steel plate	Do.
12	2904	....do	Do.
22	2905	Wrought iron	Lloyd & Symes.
22	2906	....do	Do.
27	2907	Building stone	Prof. Thos. Egleston.
Mar. 3	2908	Wrought iron	A. H. Kelsey.
3	2909	....do	Do.
3	2910	....do	Do.
3	2911	Wrought-iron chain	Sherburne & Co.
5	2912	Copper sash chain	Thomas Morton.
5	2913	....do	Do.
12	2914	Cast-iron jack screw	Providence Cast Screw Company.
12	2915	....do	Do.
15	2916	Wrought-iron plate	Lloyd & Symes.
15	2917	....do	Do.
22	2918	....do	Do.
April 4	2919	Wrought-iron bar	The Burden Iron Company.
4	2920	....do	Do.
Mar. 15	4402	Dorsett patent of asphaltum concrete	Chicago, Milwaukee and Saint Paul Railway.
15	4403	....do	Do.
15	4404	....do	Do.
15	4405	....do	Do.
15	4406	....do	Do.

PRIVATE TESTS FROM JULY 1, 1882, *TO JUNE* 30, 1883—Co

Date of test.	No. of test.	Material.	For whom te
1883.			
Mar. 15	4407	Dorsett patent of asphaltum concrete	Chicago, Milwaukee Railway.
15	4408	do	Do.
April 12	2921	Wrought iron	Lloyd & Symes.
12	2922	do	Do.
12	2922a	do	Do.
12	2923	Steel plate	Do.
12	2924	do	Do.
14	2925	Wrought-iron side-rods	Boston and Albany Rai
14	2926	do	Do.
14	2927	do	Do.
17	2928	do	Do.
17	2929	do	Do.
17	2930	do	Do.
18	2931	do	Do.
18	2932	do	Do.
18	2933	Rubber belting	Revere Rubber Compan
18	2934	do	Do.
18	2935	do	Do.
18	2936	do	Do.
18	2937	do	Do.
18	2938	do	Do.
19	2939	do	Do.
19	2940	do	Do.
19	2941	do	Do.
19	2942	do	Do.
19	2943	do	Do.
19	2944	do	Do.
19	2945	do	Do.
19	2946	do	Do.
19	2947	do	Do.
19	2948	do	Do.
19	2949	Canvas	Do.
19	2950	do	Do.
19	2951	Rubber belting	Do.
19	2952	do	Do.
19	2953	do	Do.
25	2954	Vulcanized rubber	Standard Wheel Compa
25	2955	do	Do.
26	2956	Wrought-iron boiler plate	Lloyd & Symes.
26	2957	do	Do.
26	2958	do	Do.
26	2959	do	Do.
26	2960	do	Do.
26	2961	do	Do.
27	2962	do	Do.
27	2963	Wrought iron	The Burden Iron Comp
28	2964	do	Do.
30	2965	Vulcanized rubber	Boston Standard Wheel
30	2966	Steel wire rope	J. A. Roebling's Sons Co
May 1	2967	do	Do.
1	2968	do	Do.
1	2969	do	Do.
1	2970	do	Do.
2	2971	do	Do.
2	2972	Vulcanized rubber	Boston Standard Wheel
2	2973	O. H. steel boiler plate	E. D. Leavitt, jr.
3	2974	do	Do.
3	2975	do	Do.
3	2976	do	Do.
3	2977	Cast iron	City of Boston.
3	2978	do	Do.
3	2979	do	Do.
3	2980	do	Do.
3	2981	do	Do.
4	2982	do	Do.
4	2983	Spliced wrought-iron plate	Alden & Lassig.
4	2984	do	Do.
4	2985	do	Do.
5	2986	do	Do.
5	2987	do	Do.
5	2988	do	Do.
7	2989	do	Do.
7	2990	do	Do.
7	2991	do	Do.
7	2992	do	Do.
7	2993	do	Do.
8	2994	do	Do.
8	2995	Wrought-iron eye-bar	Do.
8	2996	do	Do.

PRIVATE TESTS FROM JULY 1, 1882, TO JUNE 30, 1883—Continued.

Date of test.	No. of test.	Material.	For whom tested.
1883.			
May 8	2997	Wrought-iron eye-bar	Alden & Lassig.
8	2998	....do	Do.
8	2999	....do	Do.
8	3000	....do	Do.
8	3001	Wrought iron	Do.
9	3002	....do	James C. Warr.
9	3003	....do	Do.
9	3004	....do	Do.
9	3005	....do	Do.
9	3006	....do	Do.
9	3006a	....do	Do.
9	3007	Rubber belting	Revere Rubber Co.
9	3008	....do	Do.
9	3009	Bluestone	Peter Pitkin.
10	3010	....do	Do.
10	3011	Jack screw	Providence Cast Screw Company.
10	3012	Wrought-iron eye-bar	Missouri, Pacific Railway Company.
10	3013	....do	Do.
10	3014	....do	Do.
21	3015	Wrought-iron plate	Alden & Lassig.
18	3016	Riveted joint	E. D. Leavitt, jr.
22	3017	....do	Do.
22	3018	....do	Do.
22	3019	....do	Do.
22	3020	....do	Do.
22	3021	....do	Do.
22	3022	....do	Do.
22	3023	....do	Do.
23	3024	....do	Do.
23	3025	....do	Do.
23	3026	....do	Do.
23	3027	....do	Do.
24	3028	Cast iron	Solway Process Company.
24	3029	....do	Do.
24	3030	....do	Do.
24	3031	....do	Do.
24	3032	Wrought iron	Lloyd & Symes.
24	3033	....do	Do.
24	3034	Steel	Do.
24	3035	Wrought iron	Boston H. T. and Western Railway Company.
24	3036	....do	Do.
28	3037	Latticed column	Kellogg & Maurice.
28	3038	....do	Do.
31	3039	Spiral steel spring	Farist Steel Company.
31	3040	....do	Do.
31	3041	....do	Do.
31	3042	Red sandstone	Geo. W. White.
31	3043	....do	Do.
June 2	3044	O. H. steel plate	E. D. Leavitt, jr.
2	3045	....do	Do.
2	3046	Wire	R. C. Bayldone.
7	3047	Steel eye-bar	Geo. S. Morison.
7	3048	....do	Do.
8	3049	....do	Do.
8	3050	....do	Do.
13	3051	Wrought-iron eye-bar	Do.
13	3052	....do	Do.
15	3053	Wrought iron	Alden & Lassig.
15	3054	....do	Do.
15	3055	....do	Do.
15	3056	....do	Do.
15	3057	....do	Do.
15	3058	....do	Do.
18	3059	Steel plate	E. D. Leavitt, jr.
18	3060	....do	Do.
18	3061	Wrought-iron bar	Graff, Bennet & Co.
18	3062	....do	Do.
18	3063	Two wrought-iron bars	Do.
26	3064	Wrought-iron eye-bar	Passaic Rolling Mill Company.
26	3065	....do	Do.
26	3066	....do	Do.
26	3067	....do	Do.
Mar. 30	.....	Hydraulic gauge	American Steam Gauge Company.

INDEX TO NORTH AMERICAN WOOD TESTS.

Common name.	Botanical name.	Transverse tests.		Compression tests.		Indentation tests.		Consolidated table.	
		Numbers.	Page.	Numbers.	Page.	Numbers.	Page.	Numbers.	Page.
Abies Fraseri	Abies Fraseri	523	380	523	414	523	558	523	638
Abies grandis	Abies grandis	1009, 1010	382	1010	414	1010	560	1009, 1010	638
Abies amabilis	Abies amabilis	1004	384	1004	414	1004	560	1004	638
Abies nobilis	Abies nobilis	965	384	965	414	965	560	665	638
Alder, Seaside	Alnus maritima					810	512	810	614
Alder, Speckled	Alnus incana	862	336	374	406			374, 862	614
Alnus rubra	Alnus rubra	967-1025	334	967-1025	406	967-1025	514	967-1025	614
Alnus rhombifolia	Alnus rhombifolia	717- 635	336	717- 635	406	717- 635	514	717- 635	614
American Holly	Ilex opaca	280	248	280	393	280	424	280	570
American Crab Apple	Pirus coronaria	1087, 1088	262	808-1088	395	808-1088	440	808-1088	578
Anona glabra	Anona glabra	479	243	479	393	479	418	479	568
Ash, Prickley	Xanthoxylum Clava Herculis	735-1086	246	735-1086	393	735-1086	422	735-1086	570
Ash, American Mountain	Pirus Americana			214, 365	395	214	440	214, 365	578
Ash, Mountain	Pirus sambucifolia	410	262	410	396	410	440	410	578
Ash, White	Fraxinus Americana	39-1045	276	39-1045	397	39-1045	454	39-1045	584
Ash, Blue	Fraxinus Americana, var. Texensis	364, 937	278	364, 937	398	364, 937	458	364- 937	586
Ash, Red; Ash, Bastard	Fraxinus pubescens	139-1059	278	229, 1059	398	229, 1059	458	139-1059	586
Ash, Green	Fraxinus viridis	57- 438	278	57- 438	398	57- 438	458	57- 438	586
Ash, Water	Fraxinus platycarpa	536	280	536	398			536	586
Ash, Blue	Fraxinus quadrangulata	125- 286	280	125- 286	398	125- 286	458	125- 286	586
Ash; Oregon Ash	Fraxinus Oregona	964-1030	280	964-1030	398	964-1030	460	964-1030	588
Ash, Black	Fraxinus sambucifolia	122- 839	282	122- 839	398	122- 839	460	122- 839	588
Aspen; Quaking Asp	Populus tremuloides	272, 1035	338	272, 1035	407	272, 1035	516	272-1035	616
Bay, Sweet; Bay, White	Magnolia glauca	354	240	354	393	354	416	354	568
Bay, Loblolly	Gordonia Lasianthus	236, 414	244	236, 414	393	236, 414	418	236, 414	570
Bay, Red	Persea Carolinensis	585	284	585	398	585	464	585	590
Balsam	Abies subalpina	449, 820	382	449, 820	414	449, 820	558	449, 820	638
Balsam Poplar; Balm of Gilead	Populus balsamifera	961	338	961	407	961	518	961	616
Bass Wood	Tilia heterophylla	285, 320	24	285, 320	393	285, 320	420	285, 320	570
Bear Berry	Rhamnus Purshiana	993	248	993	394	993	424	993	572
Beech	Fagus ferruginea	9- 853	328	9- 853	405	9- 853	506	9- 853	610
Betula occidentalis	Betula occidentalis	528, 629	332	528, 629	406	528, 629	510	528, 629	612

Birch, Yellow	Betula lutea	843–1070	332	843–1070	406	843–1070	510	843–1070	612		
Birch, Red; Birch, River	Betula nigra	136– 842	334	136– 842	406	136– 842	512	136– 842	614		
Birch, Cherry; Birch, Black	Betula lenta	4– 844	334	4– 844	406	4, 844	512	4– 844	614		
Black Maple	Acer saccharinum, var. nigrum	213–757	252	213– 757	394	213– 757	428	213– 757	574		
Black Thorn; Bear Thorn	Cratægus tomentosa	426	264	426	396	426	442	426	580		
Black Haw	Viburnum prunifolium	110, 739	270	110, 739	397	110, 739	448	110, 739	582		
Black Haw	Bumelia tenax	746	272	746	397	746	452	746	584		
Black Mangrove	Avicennia nitida	490	284	490	398	490	462	490	588		
Black Jack	Quercus nigra	268	322	268, 339	404	268, 339	500	268, 339	608		
Blue Jack	Quercus cinerea	352	326	352	405	352	504	352	610		
Blue Beech; Hornbeam	Ostrya Virginica	11–1047	330	11–1047	405	11–1047	508	11–1047	612		
Black Willow	Salix nigra	855	336	232, 855	406	232, 855	514	232, 855	614		
Box Elder; Ash-leaved Maple	Negundo aceroides	311, 290	254	311, 290	394	311, 290	430	311, 290	574		
Box Elder; Soft Maple	Negundo Californicum	645	254	645	394	645	430	645	574		
Buckeye, Ohio	Æsculus glabra	297, 427	248	297, 386	394	297	424	297– 427	572		
Buckeye, Mexican	Ungnadia speciosa					944	424	944	572		
Button Tree, Buttonwood	Conocarpus erecta	489	266	489	396	489	444	489	580		
Buttonwood, Black; White Mangrove	Laguncularia racemosa	507	266	507	396	507	444	507	580		
Butternut; White Walnut	Juglans cinerea	16– 393	292	16– 145	399	16– 145	472	16– 145	594		
Buckthorn	Rhamnus Caroliniana	803, 1094	248	803	394	803	424	803, 1094	572		
Canada Plum	Prunus Americana	68, 334	258	68, 334	395	68, 334	436	68, 334	576		
Catalpa	Catalpa bignonioides	540. 744	282	540, 744	398	540, 744	462	540, 744	588		
Catalpa, Western	Catalpa speciosa	38	284	38	398	38	462	38	588		
California Nutmeg	Torreya Californica	651	352	651	409	651	530	651	622		
Cat's-claw	Acacia Greggii	697	258	697	395			697	576		
Ceresa Mexican	Prunus Capuli			418	395	418	438	418	578		
Cedar Elm	Ulmus crassifolia	324, 929	286	324, 929	399	324, 929	466	324, 929	590		
Cedar, White	Libocedrus decurrens	634, 662	342	634, 662	407	634, 662	520	634, 662	618		
Cedar, White	Chamaecyparis sphaeroidea	350– 852	344	350– 852	408	350– 852	522	350– 852	618		
Cedar, Red	Thuja occidentalis	379–1099	342	379–1099	407	379–1090	520	379–1099	618		
Cedar, Alaska; Cedar, Yellow	Thuja gigantea	1017, 1021	344	1017, 1021	408	1017, 1021	522	1017, 1021	618		
Cedar, Post, Oxford	Chamaecyparis Nutkænsis	969–1000	344	969–1000	408	969–1000	524	969–1000	620		
Cedar	Chamaecyparis Lawsoniana	701, 707	346	701, 707	408	701, 707	524	701, 707	620		
Cedar	Juniperus occidentalis, var. conjugens	1102	346	939, 1102	408	939, 1102	526	939, 1102	620		
Cedar, Red	Juniperus pachyphloea	602	346					692	620		
Cedar, Stinking	Juniperus Virginiana	14–1254	348	327–1253	408	327–1250	526	14–1254	620		
Celtis occidentalis, var. reticulata	Torreya taxifolia	62, 277	352	62, 277	409	62, 277	530	62, 277	622		
Chickasaw Plum	Celtis occidentalis, var. reticulata	652	260	652	399	652	470	652	592		
Cherry, Pigeon	Prunus angustifolia	435	260	435	395	435	436	435	576		
Cherry, Wild	Prunus Pennsylvanica			233	395	233	436	233	576		
Cherry, Wild; Cherry, Rum	Prunus emarginata, var. mollis	968	260	968	395	968	438	968	578		
Chestnut Oak	Prunus serotina	15– 763	260	15– 763	395	15– 763	438	15– 763	578		
Chestnut, Chinquapin	Quercus densifolia	687	326	687	405	687	506	687	610		
Chestnut	Castanopsis chrysophylla	729	326	729	405	729	506	729	610		
Chinquapin	Castanea vulgaris, var. Americana	18– 516	328	18– 516	405	18– 516	506	18– 516	610		
Cinnamon Bark	Castanea pumila	573	328	573	405	573	506	573	610		
Coral Sumac; Bumwood	Canella alba	1131	244	1131	393	1131	418	1131	568		
Coffee Tree, Kentucky	Rhus Metopium	467	254			467	432	467	574		
Cocoa Plum	Gymnocladus Canadensis	519–1243	356	296–1243	395	519–1243	434	296–1243	576		
Cockspur Thorn	Chrysobalanus Icaco	480	258			480	436	480	576		
	Cratægus crus-galli	328–1093	262	328, 1093	396	328, 1093	442	328–1093	578		

INDEX TO NORTH AMERICAN WOOD TESTS—Continued.

Common name.	Botanical name.	Transverse tests.		Compression tests.		Indentation tests.		Consolidated table.	
		Numbers.	Page.	Numbers.	Page.	Numbers.	Page.	Numbers.	Page.
Cornus Nuttallii	Cornus Nuttalli	960	268	960	396	960	446	960	582
Cotton Tree	Populus heterophylla	522	338	522	407	522	518	522	616
Cottonwood	Populus trichocarpa	1012, 1028	340	1012, 1028	407	1012, 1028	518	1012, 1028	616
Cottonwood	Populus monilifera	255- 754	340	255- 754	407	255- 754	518	255, 754	616
Cottonwood	Populus Fremontii	659	340	659	407	659	520	659	618
Cottonwood	Populus Fremontii, var. Wislezeni	646- 912	340	646- 912	407	646- 912	520	646- 912	618
Crab Apple, American	Pirus coronaria	1087, 1088	262	808-1088	395	808-1088	440	808-1088	578
Cucumber tree	Magnolia acuminata	246- 534	240	246- 534	393	246- 534	416	246- 534	568
Cucumber tree	Magnolia cordata	1178	240	1178	393	1178	416	1178	568
Cucumber tree, long-leaved	Magnolia Fraseri	260	240	260	393	260	416	260	568
Cypress, Monterey	Cupressus macrocarpa	675	346			675	524	675	620
Cupressus Govenina	Cupressus Goveniana	691	346	691	408	691	526	691	620
Cupressus Macnabiana	Cupressus Macnabiana	1100	346	1100	408	1100	526	1100	620
Dahoon Holly	Ilex Dahoon	484	248	484	394	484	424	484	570
Darling Plum	Reynosia latifolia	454	248	454	394	454	424	454	572
Desert Willow, Flowering Willow	Chilopsis saligna	682	284	682	398	682	462	682	588
Dogwood Jamaica	Piscidia Erythrina	564	256	564	395	564	432	564	576
Dogwood	Cornus florida	67- 812	266	67- 812	396	67- 812	446	67- 812	582
Downward Plum	Bumelia cuneata			1124	397	1124	452	1124	584
Ehretia elliptica	Ehretia elliptica	942	282	942	398	942	462	942	588
Elder, Box; Ash-leaved Maple	Negundo aceroides	311, 290	254	311, 290	394	311, 290	430	311, 290	574
Elder	Sambucus glauca	681	270	681	396	681	448	681	582
Elm, Cedar	Ulmus crassifolia	324, 929	286	324, 929	399	324, 929	466	324, 929	590
Elm, Slippery; Elm, Red	Ulmus fulva	30- 429	286	30- 134	399	30- 134	466	30- 429	590
Elm, White; Elm, Water	Ulmus Americana	19- 958	286	19- 958	399	19- 958	466	19- 958	590
Elm, Rock; Elm, American Cork	Ulmus racemosa	116- 428	288	116- 428	399	116- 428	468	116- 428	592
Elm, Water	Planera aquatica	758, 918	290	758, 918	399	758, 918	470	758, 918	592
Farkleberry, Haw	Vaccinium arboreum			343	397	343	450	343	582
Fig, Wild	Ficus aurea	486	290	486	399	486	470	486	592
Fir, Red; Fir, Yellow	Pseudotsuga Douglasii	271- 986	376	271- 986	413	271- 986	554	271- 986	636
Fir, Red; Fir, Yellow	Pseudotsuga Douglasii, var. macrocarpa	642	380	642	414	642	558	642	638
Fir, Balsam	Abies balsamea	377	382	377	414	377	558	377	638
		529- 733	382	529- 733	414	529- 733	560	529- 733	638

Guiana Plum	Diospyros crocea	468, 459	286	468, 459	399	468, 459	466	468, 459	590
Gumelastic Tree; Prickly Ash	Bumelia lanuginosa	1083, 930	274	1083, 930	397	1083, 930	452	1083, 930	584
Gum, Sweet	Liquidambar styraciflua	546–1183	264	546–1183	396	546–1183	442	546–1183	580
Gum, Sour	Nyssa sylvatica	813– 235	268	813– 517	396	813– 517	446	813– 235	582
Gum, Cotton	Nyssa uniflora	128– 604	270	128– 604	396	128– 604	448	128– 604	582
Haw	Crataegus flava, var. pubescens	767	264	767	396	767	442	767	580
Haw, Sweet	Crataegus subvillosa	949, 1081	264	949, 1081	396	949, 1081	442	949, 1081	580
Haw, Hogs	Crataegus spathulata	926	264	926	396	926	442	926	580
Haw, May; Haw, Apple	Crataegus aestivalis	239	264	239	396	239	442	239	580
Haw, Black	Viburnum prunifolium	110, 739	270	110, 739	397	110, 739	448	110, 739	582
Haw, Farkleberry	Vaccinium arboreum	.....	.....	343	397	343	450	343	582
Hemlock	Tsuga Canadensis	5–1042	374	5–1042	413	5–1042	552	5–1042	634
Hemlock	Tsuga Caroliniana	623	376	623	413	623	554	623	636
Hemlock	Tsuga Mertensiana	971, 995	376	971, 995	413	971, 995	554	971, 995	636
Hemlock	Tsuga Pottoniana	980	376	980	413	980	554	980	636
Hickory, Shellbark; Hickory, Shagbark	Carya alba	3– 539	296	3– 539	400	3– 539	476	3– 539	596
Hickory, Shellbark; Hickory, Shagbark	Carya sulcata	91–1170	298	383–1170	400	91–1170	478	91–1170	596
Hickory, Nutmeg	Carya myristicæformis	237	302	237	401	237	480	237	598
Hickory, Water; Bitter Pecan Nut	Carya aquatica	129– 917	302	129– 917	401	129– 917	482	129– 917	598
Holly, American	Ilex opaca	280	248	280	393	280	424	280	570
Holly, Dahoon	Ilex Dahoon	484	248	484	394	484	424	484	570
Hog Plum	Prunus umbellata	.....	.....	606	395	606	436	606	578
Honey Locust	Gleditschia triacanthos	53, 444	256	53, 444	395	53, 444	434	53, 444	576
Hop. Hornbeam	Ostrya Virginica	11–1047	330	11–1047	405	11–1047	508	11–1047	612
Hornbeam	Caprinos Caroliniana	46–1038	330	46–1038	405	46–1038	508	46–1038	612
Horsechestnut; Buckeye	Aesculus Californica	684	250	684	394	684	424	684	572
Horse Sugar; Sweet Leaf; Gumwood	Symplocos tinctoria	347	274	347	397	347	454	347	584
Ironwood	Cliftonia ligustrina	338	248	338	394	338	424	338	572
Ironwood	Condalia ferrea	460	248	460	394	460	424	460	572
Ironwood, White	Hypelate trifoliata	.....	.....	464	394	464	426	464	572
Ironwood	Olneya Tesota	650	256	650	395	650	432	650	576
Ironwood; Southern Buckthorn	Bumelia lycioides	333	274	333	397	333	452	333	584
Islay	Prunus ilicifolia	1158	262	1158	395	1158	440	1158	578
Ivy	Kalmia latifolia	262	272	262	397	262	450	262	584
Jamaica Dogwood	Piscidia Erythrina	564	256	564	395	564	432	564	576
Juglans rupestris	Juglans rupestris	415, 672	296	415, 672	400	415, 672	474	415, 672	594
June Berry, Shad Bush, Service Berry	Amelanchier Canadensis	241, 849	264	156– 849	396	241, 849	442	156– 849	580
Juniper	Juniperus occidentalis	.....	.....	.....	.....	624	526	624	620
Kentucky Coffee Tree	Gymnocladus Canadensis	519–1243	256	296–1243	395	519–1243	434	296–1243	576
Large-leaved Magnolia Tree	Magnolia macrophylla	532	240	532	393	532	416	532	568
Large Tupelo, Cotton Gum	Nyssa uniflora	128– 604	270	128– 604	396	128– 604	448	128– 604	582
Larix occidentalis	Larix occidentalis	719–1006	386	719–1006	415	719–1006	562	719–1006	640
Laurel, Big; Bull Bay	Magnolia grandiflora	346	240	346	393	346	416	346	568
Laurel; Calico Bush; Spoonwood; Ivy	Kalmia latifolia	262	272	262	397	262	450	262	584
Leatherwood	Cyrilla racemiflora	341	248	.....	.....	.....	.....	341	570
Lignum-vitæ	Guaiacum sanctum	476, 1133	246	476, 1133	393	476, 1133	422	476, 1133	570
Liquidambar; Sweet Gum; Bilsted	Liquidambar styraciflua	546–1183	264	546–1183	396	546–1183	442	546–1183	580

INDEX TO NORTH AMERICAN WOOD TESTS—Continued.

Common name.	Botanical name.	Transverse tests.		Compression tests.		Indentation tests.		Consolidated table.	
		Numbers.	Page.	Numbers.	Page.	Numbers.	Page.	Numbers.	Page.
Loblolly Bay	Gordonia Lasianthus	236, 414	244	236, 414	393	236, 414	418	236, 414	570
Locust; Yellow Locust	Robinia pseudacacia	405–815	254	405–815	394	405–815	432	405–815	574
Locust, Honey	Gleditschia triacanthos	53, 444	256	53–444	395	53, 444	434	53, 444	576
Locust, Water	Gleditschia monosperma	760	258	760	395	760	434	760	576
Magnolia Tree, Large Leaved	Magnolia macrophylla	532	240	532	393	532	416	532	568
Madeira Wood, Honey Berry	Hypelate paniculata	463	250	463	394			468	572
Madrona	Arbutus Menziesii	643, 679	270	643, 679	397	643, 679	450	643, 679	582
Mahogany	Swietenia mahogoni	452	246	452	393	452	422	452	570
Maple, Oregon	Acer macrophyllum	982, 1023	250	982, 1023	394	982, 1023	426	982, 1023	572
Maple, Vine	Acer circinatum	1013, 1014	250	1014	394	1013, 1014	426	1013, 1014	572
Maple, Sugar; Maple, Rock	Acer saccharinum	376–1235	250	376–1235	394	376–1235	426	376–1235	572
Maple, Black	Acer saccharinum, var. nigrum	213– 757	252	213– 757	394	213– 757	428	213– 757	574
Maple, White; Maple, Silver	Acer dasycarpum	1052	252	1052	394	1052	428	1052	574
Maple, Red; Maple, Swamp	Acer rubrum	743–1048	252	743–1048	394	743–1048	428	743–1048	574
May Haw; Apple Haw	Cratægus æstivalis	239	264	239	396	239	442	239	580
Mangrove	Rhizophora Mangle	485	266	485	396	485	444	485	580
Mangrove, Black	Avicennia nitida	490	284	490	398	490	462	490	588
Mastic	Sideroxylon mastichodendron	461	272	461	397	461	452	461	584
Meskit; Honey Locust	Prosopis juliflora, Algaroba	927, 680	258	927, 680	395	927, 680	436	927, 680	576
Mexican Buckeye	Ungnadia speciosa			944	394	944	424	944	572
Mock Orange; Wild Olive; Wild Peach	Prunus Caroliniana	1032, 1062	262	1032, 1062	395	1032, 1062	440	1032, 1062	578
Mocker Nut; Big Bud Hickory	Carya tomentosa	254– 348	300	254– 348	400	254– 348	478	254– 348	596
Mountain Mahogany	Cercocarpus ledifolius			883	395	883	440	883	578
Mulberry, Red; Mulberry, Black	Morus rubra	132–1255	292	132–1255	399	132–1255	470	132–1255	592
Myrica Californica	Myrica Californica	665	304	665	401	665	482	665	598
Myrtle	Umbellularia Californica	703	286	703	399	703	466	703	590
Naked Wood	Colubrina reclinata	1139	248					1139	572
Naseberry	Mimusops Sieberi	458	274	458	397	458	452	458	584
Oak, White	Quercus alba	8–1257	304	8–1257	401	8–1257	482	8–1257	598
Oak, White	Quercus lobata	670	308	670	401	670	486	670	600
Oak, White	Quercus Garryana	985–1029	308	985–1029	401	985–1029	486	985–1029	600
Oak, Post	Quercus obtusiloba	37– 771	310	37– 771	401	37– 771	488	37– 771	602
Oak, White	Quercus undulata, var. Gambelii	417, 525	310	417, 525	402	417, 525	488	417, 525	602
Oak, Burr	Quercus macrocarpa	79–1078	310	79–1078	402	79–1078	490	79–1078	602
Oak, Over-cup; Oak, Water White	Quercus lyrata	545, 762	312	424– 762	402	424– 762	490	424– 762	602
Oak, Swamp White	Quercus bicolor	54, 846	312	12– 846	402	12– 846	492	12– 846	604
Oak, Basket; Oak, Cow	Quercus Michauxii	755– 240	314	755– 240	402	755– 240	492	755– 240	604
Oak, Chestnut	Quercus prinus	31– 925	314	31– 925	402	31– 925	492	31– 925	604

Oak, Chinquapin; Oak, Yellow	Quercus prinoides	34- 323	314	34- 323	402	34- 514	494	34- 323	604
Oak, Mountain White; Oak, Blue	Quercus Douglasii	688	316	688	403	688	494	688	604
Oak, Evergreen White; Oak, Live	Quercus oblongifolia	655	316	655	403	655	494	655	604
Oak, White	Quercus grisea	698	316	698	403	698	494	698	604
Oak, White; Oak, Basket	Quercus Durandii	1103	316	1103	403	1103	494	1103	604
Oak, Live	Quercus virens	404- 954	316	404- 954	403	404- 954	494	404- 954	604
Oak, California Live	Quercus chrysolipis	649, 653	316	649, 653	403	649, 653	496	649, 653	606
Oak, Red	Quercus rubra	7-1043	318	7-1043	403	7-1043	496	7-1043	606
Oak, Scarlet	Quercus coccinea	752	320	752	403	752	498	752	606
Oak, Black; Oak, Quercitron	Quercus tinctoria	17- 437	320	17- 437	404	17- 437	500	17- 437	606
Oak, Black	Quercus Kelloggii	628, 963	322	628, 963	404	628, 963	500	628, 963	608
Oak, Spanish; Oak, Red	Quercus falcata	131- 548	322	131- 548	404	131- 548	502	131- 548	608
Oak, Turkey; Oak, Scrub	Quercus Catesbaei	342, 770	324	342, 770	404	342, 770	502	342, 770	608
Oak, Pin; Oak, Swamp, Spanish	Quercus palustris	47, 282	324	47, 282	404	47, 282	502	47, 282	608
Oak, Water	Quercus aquatica	349- 742	324	349- 742	404	349- 742	502	349- 742	608
Oak, Laurel	Quercus laurifolia	756, 801	326	756, 801	404	756, 801	504	756, 801	608
Oak, Bartram	Quercus heterophylla	1171	326	1171	405	1171	504	1171	610
Oak, Shingle; Oak, Laurel	Quercus imbricaria	40, 50	326	40- 135	405	40- 135	504	40- 135	610
Oak, Willow	Quercus Phellos	512	326	512	405	512	506	512	610
Oak, Chestnut	Quercus densifolia	687	326	687	405	687	506	687	610
Ogeechee Lime; Sour Tupelo	Nyssa capitata	605	268	605	396	605	446	605	582
Ohio Buckeye	Aesculus glabra	297, 427	248	297, 386	394	297	424	297- 427	572
Oregon Maple	Acer macrophyllum	982, 1023	250	982, 1023	394	982, 1023	426	982, 1023	572
Osage Orange; Bois d'arc	Maclura aurantiaca	253	292	253	399	253	472	253	594
Palo Verde	Parkinsoniana Torreyana	678	258	678	395	678	434	678	576
Papaw	Asimina triloba	211, 332	242	211	393	211	418	211, 332	568
Persimmon	Diospyros Virginiana	61- 811	274	61- 811	397	61- 811	454	61- 811	594
Pecan Nut	Carya olivæformis	322, 326	296	322, 326	400	322, 326	476	322, 326	594
Pig Nut	Carya porcina	6- 538	300	6- 538	400	6- 538	480	6- 538	598
Pine, White	Pinus strobus	1-1044	352	1-1044	409	1-1044	530	1-1044	622
Pine, White	Pinus monticola	975, 987	354	975, 987	409	975, 987	532	975, 987	624
Pine, Sugar	Pinus Lambertiana	638- 730	354	638- 730	409	638- 730	532	638- 730	624
Pine, White	Pinus flexilis	819, 913	354	819, 913	409	819, 913	532	819, 913	624
Pinus albicaulis	Pinus albicaulis	992	354	992	409	992	532	992	624
Pine, White	Pinus reflexa	661	354	661	409	661	532	661	624
Pinus Parryana	Pinus Parryana	656	354	656	409	656	532	656	624
Pinon Nut Pine	Pinus edulis	397	356	397	409	397	534	397	624
Pinon Nut Pine	Pinus monophylla	882, 915	356	882, 915	409	882, 915	534	882, 915	624
Pine, Foxtail; Pine, Hickory	Pinus Balfouriana	631	356	631	410	631	534	631	624
Pine, Foxtail	Pinus Balfouriana, var. aristata	821, 914	356	821, 914	410	821, 914	534	821, 914	624
Pine, Red; Pine, Norway	Pinus resinosa	315-1076	356	315-1076	410	315-1076	534	315-1076	626
Pinus Torreyana	Pinus Torreyana	996	356	996	410	996	534	996	626
Pine, Yellow	Pinus Arizonica	1154-1156	358	1154-1156	410	1154-1156	536	1154-1156	626
Pine, Yellow	Pinus ponderosa	619- 910	358	619- 910	410	619- 910	536	619- 910	626
Pinus Jeffreyi	Pinus Jeffreyi	633, 667	360	633, 667	410	633, 667	538	633, 667	626
Pinus Chihuahuana	Pinus Chihuahuana	664	360	664	410	664	538	664	626
Pine, Scrub	Pinus contorta	997	360	997	410	997	538	997	626
Pinus contorta, var. Murrayana	Pinus contorta, var. Murrayana	293- 625	360	293- 625	410	293- 625	538	293- 625	626
Pine, Dagger; Pine, Bull	Pinus Sabiniana	644	360	644	410	644	538	644	628
Pine, Bull; Pine, Yellow	Pinus Coulteri	1157	360	1157	410	1157	538	1157	628
Pinus insignis	Pinus insignis	676	362	676	410	676	540	676	628

INDEX TO NORTH AMERICAN WOOD TESTS—Continued.

Common name.	Botanical name.	Transverse tests.		Compression tests.		Indentation tests.		Consolidated table.	
		Numbers.	Page.	Numbers.	Page.	Numbers.	Page.	Numbers.	Page.
Pinus tuberculata	Pinus tuberculata	576	362	576	410	576	540	576	628
Pine, Loblolly; Pine, Old Field	Pinus tæda	82–389	362	82–389	411	82–389	540	82–389	628
Pine, Pitch; Pine, Yellow	Pinus rigida	13, 1046	362	13, 1046	411	13, 1046	540	13, 1046	628
Pine, Pond	Pinus serotina	83	362	83	411	83	540	83	628
Pine, Jersey; Pine, Scrub	Pinus inops	622–1172	364	622–1172	411	622–1172	542	622–1172	628
Pinus inops, var. clausa	Pinus inops, var. clausa	279	364	279	411	279	542	279	628
Pine, Table Mountain; Pine, Black	Pinus pungens	321	364	321	411	321	542	321	628
Pinus muricata	Pinus muricata	671	364	671	411	671	542	671	630
Pine, Yellow	Pinus mitis	278, 319	364	278, 319	411	278, 319	542	278, 319	630
Pine, Spruce	Pinus glabra	142–764	364	142–764	411	142–764	542	142–764	630
Pine, Scrub; Pine, Gray	Pinus Banksiana	394–879	366	394–879	411	394–879	544	394–879	630
Pine, Long-leaved; Pine, Southern	Pinus palustris	81–1096	366	81–390	412	81–390	544	81–1096	630
Pine, Slash; Pine, Bastard	Pinus Cubensis	84–493	370	84–493	412	84–493	546	84–493	632
Pisonea obtusa	Pisonea obtusa			474	398	474	464	474	588
Plum, Wild; Plum, Canada	Prunus Americana	68, 334	258	68, 334	395	68, 334	436	68, 334	576
Plum, Chickasaw	Prunus angustifolia	435	260	435	395	435	436	435	576
Plum, Hog	Prunus umbellata			606	395	606	436	606	578
Plum, Pigeon	Coccoloba Floridana	473	284	473	398	473	464	473	588
Plum, Guiana	Drypetes crocea	468, 459	286	468, 459	399	468, 459	466	468, 459	590
Poplar, White	Liriodendron tulipifera	1231	242	1231	393	1231	418	1231	568
Poplar, Yellow	do	1232	242	1232	393	1232	418	1232	568
Poplar, Yellow; White Wood	do	1236–1238	242	1236	393	1236	418	1236–1238	568
Poplar	Populus grandidentata	847	338	847	407	847	518	847	616
Poplar, Balsam; Balm of Gilead	Populus balsamifera	961	338	961	407	961	518	961	616
Populus balsamifera, var. candicans	Populus balsamifera, var. candicans	1054	338	1054	407	1054	518	1054	616
Populus angustifolia	Populus angustifolia	552	340	552	407	552	518	552	616
Prunus demissa	Prunus demissa	637	262	637	395	637	438	637	578
Quercus rubra, var. Texana	Quercus rubra, var. Texana	931	320	931	403	931	498	931	606
Quercus hypoleuca	Quercus hypoleuca	674	326	674	405	674	504	674	610
Red Bud; Judas Tree	Cercis Canadensis	436–1091	258	436–1091	395	436–1091	434	436–1091	576
Redwood	Sequoia sempervirens	673–715	350	673–715	409	710–715	528	673–715	622
Robinia Neo Mexicana	Robinia Neo Mexicana	1031	256	1031	395	1031	432	1031	576
Satin Wood; Yellow Wood	Xanthoxylum Caribæum	1140	246	1140	393	1140	422	1140	570
Satin Wood	Chrysophyllum oliviforme	492	272	492	397	492	452	492	584
Sassafras	Sassafras officinale	71–854	284	71–854	398	71–854	464	71–854	590
Salix amygdaloides	Salix amygdaloides	908, 911	336	908, 911	406	908, 911	514	908, 911	616
Salix lævigata	Salix lævigata	690	336	690	406	690	516	690	616
Salix lasiandra, var. lancifolia	Salix lasiandra, var. lancifolia	640, 981	336	640, 981	407	640, 981	516	640, 981	616

Salix lasiandra, var. Fendleriana		889	338	889	407	889	516	889	616
Salix flavescens		721	338	721	407	721	516	721	616
Salix flavescens, var. Scouleriana		972	338	972	407	972	516	972	616
Salix Hookeriana				966	407	966	516	966	616
Salix lasiolepis		669	338	669	407	669	516	669	616
Salix petriolaris		1177	338	1177	407	1177	516	1177	616
Sea Grape	Coccoloba uvifera			453	398			453	588
Seaside Alder	Alnus maritima					810	512	810	614
Sheep Berry	Viburnum Lentago			370	397			370	582
Snow Drop Tree	Halesia diptera	738	274	738	397	738	454	738	584
Soap Berry; Wild China Tree	Sapindus marginatus	307, 928	250	307, 928	394	307, 928	426	307, 928	572
Sophora affinis	Sophora affinis	329, 932	256	329, 932	395	329, 932	434	329, 932	576
Sorrelwood; Sourwood	Oxydendrum arboreum	353	272	353, 515	397	353, 515	450	353, 515	584
Spruce, Black; Spruce, Red	Picea nigra	231- 880	370	231- 880	412	231- 880	548	231- 880	632
Spruce, White	Picea alba	513- 791	372	513- 791	412	513- 791	548	513- 791	632
Spruce	Picea Engelmanni	292- 822	372	292- 822	412	292- 822	550	292- 822	634
Spruce	Picea pungens	269, 270	372	269, 270	412	269, 270	550	269, 270	634
Spruce, Tide Water	Picea Sitchensis	970-1026	372	970-1026	413	970-1026	550	970-1026	634
Stopper; Gurgeon Stopper	Eugenia buxifolia	1118	266	1118	396	1118	444	1118	580
Stopper, White	Eugenia monticola	1135	266	1135	396	1135	444	1135	580
Stopper, Red	Eugenia procera	1127	266	1127	396	1127	446	1127	580
Stopper, Red; Cassada Bustic	Dipholis salicifolia	488, 500	272	488, 500	397	488, 500	452	488, 500	584
Strong Bark	Bourreria Havanensis	1137	282	1137	398	1137	462	1137	588
Sumac	Rhus copallina	736	254	736	394	736	430	736	574
Sumac	Rhus copallina, var. lanceolata			330	394	330	430	330	574
Sumac, Coral; Bumwood	Rhus Metopium	467	254			467	432	467	574
Sugarberry; Hackberry; False Elm	Celtis occidentalis	75-1111	290	75-1111	399	75-1111	470	75-1111	592
Sweet Bay, White Bay	Magnolia glauca	354	240	354	393	354	416	354	568
Sweet Haw	Crataegus subvillosa	949, 1081	264	949, 1081	396	949, 1081	442	949, 1081	580
Sycamore; Buttonwood	Platanus occidentalis	21, 126	292	21, 126	399	21, 126	472	21, 126	594
Sycamore	Platanus racemosa	686	292	686	399	686	472	686	594
Sycamore	Platanus Wrightii	648	292	648	399	648	472	648	594
Tallow Berry	Byrsonema lucida	1113	246	1113	393	1113	422	1113	570
Tamarind, Wild	Lysiloma latisiliqua	509	258	509, 1112	395	509, 1112	436	509, 1112	576
Tamarack	Larix Americana	226- 840	384	226- 840	414	226- 840	560	226- 840	640
Thorn	Crataegus arborescens	607	262	363, 607	396	363, 607	440	363, 607	578
Thorn, Cockspur	Crataegus crus-galli	328, 1093	262	328, 1093	396	328, 1093	442	328, 1093	580
Thorn, Black; Thorn, Bear	Crataegus tomentosa	426	264	426	396	426	442	426	580
Torchwood	Amyris sylvatica	475	246	475	393	475	422	475	570
Tornilla: Screw Bean; Screw Pod; Meskit	Prosopis pubescens	658	258	658	395	658	436	658	576
Tulip Tree; White Wood; Yellow Poplar	Liriodendron tulipifera	395	242	138, 395	393	395	418	138, 395	568
Tupelo; Sour Gum; Pepperidge; Bear Oak	Nyssa sylvatica	813- 236	268	813- 517	396	813- 517	446	813- 235	582
Tupelo, Large; Cotton Gum	Nyssa uniflora	128- 604	270	128- 604	396	128- 604	448	128- 604	582
Umbrella Tree	Magnolia umbrella	266	240	266	393	266	416	266	568
Wahoo	Tilia Americana	745	244	745	393	745	420	745	570
Wahoo; Feathered Elm; Winged Elm; Small-leaved Elm.	Ulmus alata	133- 533	288	133- 533	399	133- 533	468	133- 533	592
Water Locust	Gleditschia monosperma							760	576
Walnut, Black	Juglans nigra	760 112- 766	258 204	760 112- 766	395 400	760 112- 766	434 474	112- 766	594

INDEX TO NORTH AMERICAN WOOD TESTS—Continued.

Common name.	Botanical name.	Transverse tests.		Compression tests.		Indentation tests.		Consolidated table.	
		Numbers.	Page.	Numbers.	Page.	Numbers.	Page.	Numbers.	Page.
Wax Myrtle	Myrica cerifera	586	304	586	401	586	482	586	598
Washingtonia filifera	Washingtonia filifera	1159	386	1159	415	1159	564	1159	640
White Wood; Bass Wood	Tilia Americana	2–316	244	2–124	393	2–124	420	2–124	570
Wild Olive; Devil Wood	Osmanthus Americanus	283, 584	282	283, 584	398	283, 584	462	283, 584	588
Willow Desert; Willow, Flowering	Chilopsis saligna	682	284	682	398	682	462	682	588
Willow, Black	Salix nigra	855	336	232, 855	406	232, 855	514	232, 855	614
Yellow Wood	Cladrastis tinctoria	33	256	33, 439	395	33	434	33, 439	576
Yew	Taxus brevifolia	978	356	978	409	978	530	978	622

ERRATA.

Page.
239. Word "fractions" should read "fractures."
395. Number "937*a*" should read "637*a*."
504. Number "252*a*" should read "352*a*."
512. Number "10" should read "810."
578. "Prius coronaria" should read "Pirus coronaria."
580. "Cratægus tomentos" should read "Cratægus tomentosa."
582. Number "360*b*" should read "960*b*."
604. Number "24$_3$*a*" should read "34$_3$*a*."
620. Number "250*c*" should read "350*c*."
620. "Port Oxford cedar" should read "Post Oxford cedar."

INDEX.

	Page.
AMERICAN WOODS:	
Index to tables	658–665
Transverse tests:	
Description of	237
Tabulation	240–391
Compression tests:	
Description of	392
Tabulation	393–415
Indentation tests:	
Description of	415
Tabulation	416–565
Consolidated table	567–641
Color classification	642–647
ANALYSES, CHEMICAL:	
Wrought iron, square bars	54
Steel from tube of Woodbridge gun	193
Steel eye-bar heads	195
Wrought iron from Oregon pig	213
BRICKS:	
Eastern face	217
Eastern common	218
(Old) Bay State	219
Various manufacturers	220
COLUMNS, WROUGHT-IRON, BUILT; PIN ENDS:	
Description of tests	119
Details of tests:	
6-inch channels, solid web	121–126
8-inch channels, solid web	127–131
8-inch box, channels and plates	132
8-inch box, $\frac{A}{16}$-inch plates and angles	134
8-inch box, $\frac{7}{16}$-inch plates and angles	136
8-inch channels, latticed, pins parallel to webs of channel bars	139–144
8-inch channels, latticed, swelled sides	145–150
8-inch channels, latticed, swelled sides, pins in second position	150
10-inch channels, latticed	151, 153, 155, 156
10-inch channels, latticed, pins in second position	152, 154–157
10-inch channels, latticed, swelled sides	157, 159, 160, 163
10-inch channels, latticed, swelled sides, pins in second position	158, 160, 162, 164
10-inch channels, latticed, and continuous plate, pins in center of gravity of channels, and continuous plate	164–166
10-inch channels, latticed, and continuous plate, pins in center of gravity of channels	167
Tabulation of results	169
COLUMNS, WROUGHT-IRON SQUARE BARS, 3″ x 3′:	
Tabulation, tensile tests of material	54
Chemical analysis	55
Details of tests with:	
Two $1\frac{1}{2}$-inch pins	55–101
Two flat ends	102–105
One flat end and one $1\frac{1}{2}$-inch pin end	106–109
Two $\frac{7}{8}$-inch pins	110
Two $1\frac{1}{8}$-inch pins	112
Two $1\frac{7}{8}$-inch pins	114
Two $2\frac{1}{4}$-inch pins	116
Tabulation of results	118
Ordinates of curves of flexure after the tests	104, 105, 109–112

	Page.
Concrete, shearing of	222
Chain cable	213
Cold swaged steel bars:	
Compression	172
Tension	178
Cold rolled steel bars:	
Compression	176
Tension	182
Cold drawn steel bars:	
Compression	191
Tension	187
EYE-BARS, STEEL:	
Account of manufacture and specimen tests of material	194
Chemical analyses of heads	195
Details of tests	196–206
Tabulation of results	206
Tables and curves, showing effect of loads above primitive elastic limit	207
GROOVED PLATES:	
Wrought iron, drilled	10
Wrought iron, punched	12
Steel, drilled	14
Steel, punched	16
Leather-hose, riveted joint	217
Private tests, table of	651–657
RIVETED JOINTS, DETAILS OF:	
Iron plate, single riveted lap	18
Iron plate, single riveted butt	23
Steel plate, single riveted lap	31
Steel plate, single riveted butt	37
RIVETED JOINTS, TABULATION OF:	
Iron plate, single riveted lap	46
Iron plate, single riveted butt	46, 48
Steel plate, single riveted lap	48, 50
Steel plate, single riveted butt	50, 52
Grooved plates, iron and steel	10–16
STEEL BARS:	
Hot rolled	186
Cold rolled	176, 182
Cold drawn	187–193
Cold swaged	172, 178
Woodbridge gun tube	193
Stone, manufactured	221
Woods, American, index to tables	658–665
WOOD, CALIFORNIA LAUREL:	
Compression	223
Indentation	225
Shearing	226
Transverse	227–236
Tensile	236
WROUGHT IRON:	
Compression of 3″ x 3″ bars. (See COLUMNS.)	
Piston-rod, from 20″ gun carriage	208
Bars made from Oregon pig	210
Bars made from Oregon pig, chemical analysis	213
Chain cable	213
Plates and bars	215

O

3 2044 102 888 161